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NASA Contractor Report 3224

A Supersonic Three-Dimensional Code for Flow Over Blunt Bodies - Program Documentation and Test Cases

D. S. Chaussee and O. J. McMillan

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A Supersonic Three-Dimensional Code for Flow Over Blunt Bodies - Program Documentation and Test Cases

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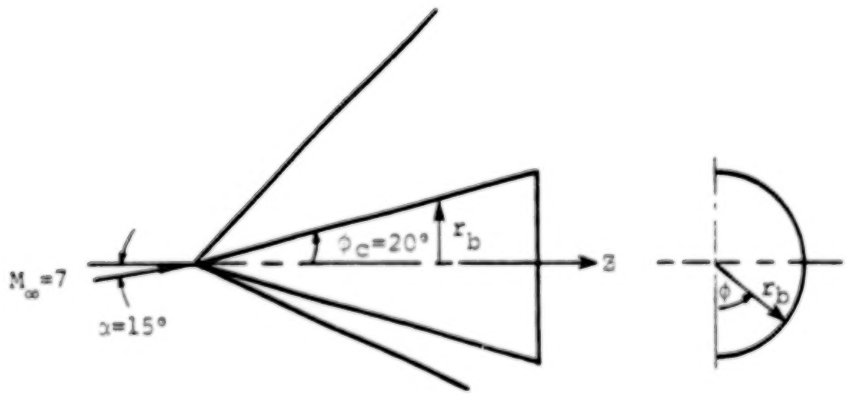
1. INTRODUCTION

In this report we present various test cases to exemplify the use of the three-dimensional code employed to calculate supersonic flow over blunt bodies.

Problem formulation, mathematical framework and the overall program logic are presented in a separate report (ref. 1). In section 2 of this report we present the input data and answer listings for the first test case which is for a 20° half-angle cone at 15° angle of attack and a free-stream Mach number of 7. Section 3 of this report involves the test case for a cone-ogive-cylinder at 10° angle of attack and a free-stream Mach number of 2.86. A complete listing of the code is given in the appendix.

2. FIRST TEST CASE: CONE

The first test case is for a 20° half-angle cone at 15° angle of attack and a free-stream Mach number of 7 as shown below.



The input data cards required are listed below. Further information about the parameters specified on these cards is provided in reference 1. Following this list is the input data set used for the first test case.

Card No.	Format	Variables	
1	8I5	NSEG:	Number of segment points.
		KIND:	Flag for kind of segment. 0 = sphere or circular ogive 1 = circular cone 2 = circular cone with flat cut
2	8F10.6	ZSEG:	Z - station initiating segment.
3	8F10.6	RSEG:	r - coord. initiating segment.
4	8F10.6	DSEG:	Distance from centerline to flat chord, initiating segment.
5	8F10.6	ASEG:	ϕ_{seg} - Angle between straight down and DSEG initiating segment.
5a	3F10.6	ZC:	Z at center of longitudinal arc.
		RC:	r at center of longitudinal arc.
		RADIUS:	Radius of longitudinal arc.

(Cards 6-11 are read in SUB.INPUT)

6	3E15.6, 5X,I5	XMACH:	Mach number
		ALPHA:	Angle of attack (degrees)
		GAMMA:	Ratio of specific heats
		NREAL:	0 for perfect gas, -1 for real gas (pointed cone starting solutions are generated internally for perfect gas option only).
7	3F10.5	PHIFD:	Meridional angle about which points are clustered.
		RK:	Meridional clustering parameter (0 for no clustering).
		RJ:	Radial clustering parameter (0 for no clustering).

Card No.	Format	Variables	
8	5I5	NIT:	No. of points between body and shock (max = 20)
		NIPHI:	No. of intervals in meridional direction (max = 36)
		NITER:	No. of integration steps desired (when ZEND is specified set NITER to 99999)
		ICONST(49):	Stepsize is computed every ICONST(49) iterations (5 is nominal)
		NCONE:	1 for pointed cone solutions, 2 for all other geometries
9	3F10.5	CONST(9):	Courant No. (usually 0.9)
		CONST(4):	Radial dissipation constant
		CONST(5):	Meridional dissipation constant
10	5I5	DISK 1:	1 reads solution from tape, 2 writes solution on tape, 3 does nothing (logical unit 12)
		DISK 2:	1 reads solution from tape, 2 writes solution on tape, 3 does nothing (logical unit 11)
		TAPE 1:	1 does nothing, 2 stores body shape and writes data on tape each Z station, 3 writes data only (logical unit 9)
		TAPE 2:	1 does nothing, 2 reads starting solution from punched cards, 3 stores solution on punched cards when exiting (logical unit 7). If TAPE2 = 1 and DISK 1 and DISK 2 = 2 or 3, a pointed cone solution will be generated for the perfect gas case only
		NTDSOS:	0
11	2F10.5 3I5	ZBS:	increment in z for printing shock and body variables (ZBS > ZEND if not desired) — print based on z station
		ZFLD:	increment in z for printing field variables (ZFLD > ZEND if not desired) — print based on z station

Card No.	Format	Variables	
		ITPRTB: No. of iterations for printing shock and body variables (ITPRTB > NITER if not desired)	print based on number of iterations
		ITPRTF: No. of iterations for printing field variables (ITPRTF > NITER if not desired)	
		NCASE: If > 0, new case follows	

(The following card contains values used in force and moment calculations or in shifting the origin of the pointed-cone starting solution.)

12	5F10.5 I5	DIAM: Length used in calculating reference area; usually maximum diameter
		ALENGT: Reference length used in calculating moments
		ZREF: Moment reference center
		ZCG: Center of gravity location for static margin calculation
		ZSHIFT: The value of Z which corresponds to the starting cone origin; if no shift set = 0
		IFANDM: 0, force and moment calculation 1, no force and moment calculation

(If starting solution is to be read from punched cards (TAPE 2 = 2), the following three cards are read in main program. If solution is read from magnetic storage device, these are not required.)

12a	5E15.6	XMACH, ALPHA, GAMMA, RK, PHIFD: (Defined above)
12b	5E15.6	RJ: (Defined above)
12c	3I5, 4E15.6	NIT, NIPHI, NREAL: (Defined above)
		P1INF: free stream pressure, R1INF: free stream density, V1INF: free stream velocity, GASCON: gas constant (1716.0 for air) — real gas option only (dimensional)

Card No.	Format	Variables

[If NREAL = -1, gas tables are placed here and will be read in SUB.RGAS(523 cards for equilibrium air)]

(If TAPE 2 = 2 punch card starting solution is placed here. The first card is the Z station of the starting plane and is followed by flow variables at each node.)

(The following card(s) is used to change the program control variables at preselected longitudinal (Z) stations and is read in Program MAIN. At least one card is required if no modifications are asked for. In this case ZALTER should then be > ZEND)

Card No.	Format	Variables
13	F10.5,I2,I3,F10.5,I2,I3	ZALTER: Z station where altering occurs
		NITA: New NIT
		NIPHEA: New NIPHI
		RJA: New RJ
		RKA: New RK
		PHFDA: New PHFD
		STP: 0, stepsize determined automatically >0, value of desired constant stepsize
		DISS1: New CONST(4)
		DISS2: New CONST(5)
		NSWCH1: 0, new MacCormack 1, old MacCormack
		NSWCH5: 0, no entropy relaxation 1, entropy relaxation

(The following card is used to initialize the force and moment calculations, and is read in SUB.COMPUT. This card is needed only if IFANDM = 0. *If NCONE = 2 and IFANDM = 0 this card is read before the first card 13, otherwise it is read after all card 13's.)

Card No.	Format	Variables
14	6F12.8	FTX: FTY: FTZ: initial plane forces in the z, r, ϕ direction
		RMTX: RMTY: RMTZ: initial plane moments in the z, r, ϕ direction

Sample Input for First Test Case

```
0.0          0.0          0.0          0.0          0.0          0.0                    14
10001.                                                                                  13
800.       20 18 0.0          0.          90.          .0          .00          .00     0  13
1.0        1.0          0.0          0.0          0.0          0                      12
10000.     10000.       750 1500     0                                                 11
     3     3     1     1     0                                                         10
0.5        0.0          0.0                                                           9
   20    18 1500     5     1                                                          8
90.0       0.0          0.0                                                           7
7.0                15.00          1.4                0                               6
0.0        0.0                                                                        5
0.0        0.0                                                                        4
.24297022424279.70214                                                                 3
1.0        100000.                                                                    2
     2     1     1                                                                   CARD 1
```

A complete output for this test case is now presented. In the following, the velocities are made dimensionless with respect to the maximum adiabatic velocity, $V_m = \sqrt{2\gamma/\gamma-1 \cdot p_{t_\infty}/\rho_{t_\infty}}$ and the pressure and density for the complete flow field printout are normalized with respect to the free stream stagnation conditions. Polar coordinates (z,r,ϕ) are used with the corresponding velocity components (u,v,w). The circumferential index is k, the radial index is j (j = 3 indicates the body surface). The output consists of the following sections:

1. Printout of the input quantities
2. Printout of the free-stream velocity field and the computational mesh. TAU is the radial computational variable, XI is the normalized physical radial variable running from 0 on the body to 1 at the shock. TXI = $\frac{\partial(TAU)}{\partial(XI)}$, TXIT = $\frac{\partial(TXI)}{\partial(TAU)}$. ETA is the computational circumferential variable, DTIL = $\frac{\partial(ETA)}{\partial(PHI)}$, DTILE = $\frac{\partial(DTIL)}{\partial(ETA)}$.
3. Intermediate printout of shock and body variables controlled by card 11.
4. Printout of the flow field at the final z station.
5. Line-printer plot of the normalized density field at the final z station.
6. Printout of the shock and body variables at the final z station.
7. The solution reset to the initial z plane using the conical property of the converged flow field. Sections 4-6 are repeated at z-initial.
8. Printout of the force and moment calculations.

```
NSEG,KIND    2    1    1    0    0    0    0    0
ZSEG    1.00000**********      -I        -I        -I        -I        -I
RSEG     .363973639.70234      -I        -I        -I        -I        -I
DSEG    0.00000   0.00000      -I        -I        -I        -I        -I
ASEG    0.00000   0.00000      -I        -I        -I        -I        -I
```

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```
MACH =  7.000000
ALPHA = 15.000000
GAMMA = 1.400
SIGMA = 20.00

Z-INITIAL =    1.00
Z-FINAL =  10000.00
PHI-ZERO =  90.00

NIT = 20
NIPHI = 18
METHOD ORDER = 2
NITER = 1500
NPRNT = 0
IPRNT = 1
NCONE = 1
NWRPRT= 0
NREAL = 0

DZ/DT =  0.000 INITIALLY
DELTA-X =  0.000
DELTA-Y =  0.000

DISK1 = 3
DISK2 = 3
TAPE1 = 1
TAPE2 = 1

PERCENT OF MAX. STEPSIZE =  .90
METHOD = 2
BND. COND. = 1
BETA=0.000
OMEGA= 0.000

PINF =     .241555E-03     RHOIN =     .260880E-02     QINF =     .952579E+00

GASCON= 1.7160E+03

K =  3     PHI=  0.000000     UINF=  .920121     VINF=  -.246546     WINF=  0.000000
K =  4     PHI= 10.000000     UINF=  .920121     VINF=  -.242800     WINF=  .042812
K =  5     PHI= 20.000000     UINF=  .920121     VINF=  -.231677     WINF=  .084324
K =  6     PHI= 30.000000     UINF=  .920121     VINF=  -.213515     WINF=  .123273
K =  7     PHI= 40.000000     UINF=  .920121     VINF=  -.188865     WINF=  .158477
K =  8     PHI= 50.000000     UINF=  .920121     VINF=  -.158477     WINF=  .188865
K =  9     PHI= 60.000000     UINF=  .920121     VINF=  -.123273     WINF=  .213515
K = 10     PHI= 70.000000     UINF=  .920121     VINF=  -.084324     WINF=  .231677
K = 11     PHI= 80.000000     UINF=  .920121     VINF=  -.042812     WINF=  .242800
K = 12     PHI= 90.000000     UINF=  .920121     VINF=  -.000000     WINF=  .246546
K = 13     PHI=100.000000     UINF=  .920121     VINF=   .042812     WINF=  .242800
K = 14     PHI=110.000000     UINF=  .920121     VINF=   .084324     WINF=  .231677
K = 15     PHI=120.000000     UINF=  .920121     VINF=   .123273     WINF=  .213515
K = 16     PHI=130.000000     UINF=  .920121     VINF=   .158477     WINF=  .188865
K = 17     PHI=140.000000     UINF=  .920121     VINF=   .188865     WINF=  .158477
K = 18     PHI=150.000000     UINF=  .920121     VINF=   .213515     WINF=  .123273
K = 19     PHI=160.000000     UINF=  .920121     VINF=   .231677     WINF=  .084324
K = 20     PHI=170.000000     UINF=  .920121     VINF=   .242800     WINF=  .042812
K = 21     PHI=180.000000     UINF=  .920121     VINF=   .246546     WINF=  .000000
```

RADIAL MESH DESCRIPTION

J= 3	TAU= 0.	XI = 0.	TXI = .1000E+01	TXIT = 0.
J= 4	TAU= .4762E-01	XI = .4762E-01	TXI = .1000E+01	TXIT = 0.
J= 5	TAU= .9524E-01	XI = .9524E-01	TXI = .1000E+01	TXIT = 0.
J= 6	TAU= .1429E+00	XI = .1429E+00	TXI = .1000E+01	TXIT = 0.
J= 7	TAU= .1905E+00	XI = .1905E+00	TXI = .1000E+01	TXIT = 0.
J= 8	TAU= .2381E+00	XI = .2381E+00	TXI = .1000E+01	TXIT = 0.
J= 9	TAU= .2857E+00	XI = .2857E+00	TXI = .1000E+01	TXIT = 0.
J=10	TAU= .3333E+00	XI = .3333E+00	TXI = .1000E+01	TXIT = 0.
J=11	TAU= .3810E+00	XI = .3810E+00	TXI = .1000E+01	TXIT = 0.
J=12	TAU= .4286E+00	XI = .4286E+00	TXI = .1000E+01	TXIT = 0.
J=13	TAU= .4762E+00	XI = .4762E+00	TXI = .1000E+01	TXIT = 0.
J=14	TAU= .5238E+00	XI = .5238E+00	TXI = .1000E+01	TXIT = 0.
J=15	TAU= .5714E+00	XI = .5714E+00	TXI = .1000E+01	TXIT = 0.
J=16	TAU= .6190E+00	XI = .6190E+00	TXI = .1000E+01	TXIT = 0.
J=17	TAU= .6667E+00	XI = .6667E+00	TXI = .1000E+01	TXIT = 0.
J=18	TAU= .7143E+00	XI = .7143E+00	TXI = .1000E+01	TXIT = 0.
J=19	TAU= .7619E+00	XI = .7619E+00	TXI = .1000E+01	TXIT = 0.
J=20	TAU= .8095E+00	XI = .8095E+00	TXI = .1000E+01	TXIT = 0.
J=21	TAU= .8571E+00	XI = .8571E+00	TXI = .1000E+01	TXIT = 0.
J=22	TAU= .9048E+00	XI = .9048E+00	TXI = .1000E+01	TXIT = 0.
J=23	TAU= .9524E+00	XI = .9524E+00	TXI = .1000E+01	TXIT = 0.
J=24	TAU= .1000E+01	XI = .1000E+01	TXI = .1000E+01	TXIT = 0.

MERIDIANOL MESH DESCRIPTION

K= 2	ETA= -.1745E+00	PHI= -.1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 3	ETA= 0.	PHI= 0.	DTIL= .1000E+01	DTILE= 0.
K= 4	ETA= .1745E+00	PHI= .1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 5	ETA= .3491E+00	PHI= .3491E+00	DTIL= .1000E+01	DTILE= 0.
K= 6	ETA= .5236E+00	PHI= .5236E+00	DTIL= .1000E+01	DTILE= 0.
K= 7	ETA= .6981E+00	PHI= .6981E+00	DTIL= .1000E+01	DTILE= 0.
K= 8	ETA= .8727E+00	PHI= .8727E+00	DTIL= .1000E+01	DTILE= 0.
K= 9	ETA= .1047E+01	PHI= .1047E+01	DTIL= .1000E+01	DTILE= 0.
K=10	ETA= .1222E+01	PHI= .1222E+01	DTIL= .1000E+01	DTILE= 0.
K=11	ETA= .1396E+01	PHI= .1396E+01	DTIL= .1000E+01	DTILE= 0.
K=12	ETA= .1571E+01	PHI= .1571E+01	DTIL= .1000E+01	DTILE= 0.
K=13	ETA= .1745E+01	PHI= .1745E+01	DTIL= .1000E+01	DTILE= 0.
K=14	ETA= .1920E+01	PHI= .1920E+01	DTIL= .1000E+01	DTILE= 0.
K=15	ETA= .2094E+01	PHI= .2094E+01	DTIL= .1000E+01	DTILE= 0.
K=16	ETA= .2269E+01	PHI= .2269E+01	DTIL= .1000E+01	DTILE= 0.
K=17	ETA= .2443E+01	PHI= .2443E+01	DTIL= .1000E+01	DTILE= 0.
K=18	ETA= .2618E+01	PHI= .2618E+01	DTIL= .1000E+01	DTILE= 0.
K=19	ETA= .2793E+01	PHI= .2793E+01	DTIL= .1000E+01	DTILE= 0.
K=20	ETA= .2967E+01	PHI= .2967E+01	DTIL= .1000E+01	DTILE= 0.
K=21	ETA= .3142E+01	PHI= .3142E+01	DTIL= .1000E+01	DTILE= 0.
K=22	ETA= .3316E+01	PHI= -.2967E+01	DTIL= .1000E+01	DTILE= 0.

SURFACE FLOW VARIABLES AT Z = 52.042571
X/L = .005204 DZDT= 5.956151 ITER= 750

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	M/MT	TEMP	(S-S.INF)/CV
0.0	18.9419	.6709	2.4012E+01	5.0298E+00	2.3607	.8592	0.0000	2.9733E-01	1.0000	.44204	.00	9.1703E-01
10.0	18.9419	.6616	2.3694E+01	4.9821E+00	2.3675	.8617	.0841	2.9677E-01	1.0000	.44036	.00	9.1703E-01
20.0	18.9419	.6346	2.2767E+01	4.8421E+00	2.3877	.8691	.1679	2.9508E-01	1.0000	.43536	.00	9.1703E-01
30.0	18.9419	.5919	2.1303E+01	4.6175E+00	2.4218	.8818	.2506	2.9229E-01	1.0000	.42717	.00	9.1703E-01
40.0	18.9419	.5368	1.9413E+01	4.3211E+00	2.4701	.8990	.3318	2.8844E-01	1.0000	.41598	.00	9.1703E-01
50.0	18.9419	.4733	1.7234E+01	3.9687E+00	2.5332	.9220	.4106	2.8357E-01	1.0000	.40207	.00	9.1703E-01
60.0	18.9419	.4056	1.4913E+01	3.5797E+00	2.6116	.9505	.4863	2.7777E-01	1.0000	.38579	.00	9.1703E-01
70.0	18.9419	.3379	1.2588E+01	3.1714E+00	2.7059	.9848	.5580	2.7113E-01	1.0000	.36757	.00	9.1703E-01
80.0	18.9419	.2737	1.0387E+01	2.7643E+00	2.8162	1.0250	.6244	2.6378E-01	1.0000	.34791	.00	9.1703E-01
90.0	18.9419	.2155	8.3901E+00	2.3734E+00	2.9429	1.0711	.6837	2.5586E-01	1.0000	.32733	.00	9.1703E-01
100.0	18.9419	.1650	6.6550E+00	2.0120E+00	3.0852	1.1229	.7341	2.4755E-01	1.0000	.30640	.00	9.1703E-01
110.0	18.9419	.1232	5.2251E+00	1.6923E+00	3.2407	1.1795	.7711	2.3913E-01	1.0000	.28591	.00	9.1703E-01
120.0	18.9419	.0899	4.0842E+00	1.4193E+00	3.4064	1.2398	.7889	2.3086E-01	1.0000	.26648	.00	9.1703E-01
130.0	18.9419	.0648	3.2218E+00	1.1980E+00	3.5746	1.3010	.7806	2.2316E-01	1.0000	.24901	.00	9.1703E-01
140.0	18.9419	.0471	2.5150E+00	1.0321E+00	3.7318	1.3583	.7362	2.1661E-01	1.0000	.23460	.00	9.1703E-01
150.0	18.9419	.0365	2.2523E+00	9.2769E-01	3.8590	1.4046	.6142	2.1204E-01	1.0000	.22480	.00	9.1703E-01
160.0	18.9419	.0321	2.0998E+00	8.8237E-01	3.9350	1.4322	.3957	2.0993E-01	1.0000	.22034	.00	9.1703E-01
170.0	18.9419	.0310	2.0633E+00	8.7141E-01	3.9619	1.4420	.1721	2.0940E-01	1.0000	.21924	.00	9.1703E-01
180.0	18.9419	.0309	2.0583E+00	8.6988E-01	3.9670	1.4439	0.0000	2.0933E-01	1.0000	.21909	.00	9.1703E-01

BODY AND SHOCK GEOMETRY AT Z =52.043

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	18.9419	.3640	0.0000	22.8994	.4400	0.0000
10.0	18.9419	.3640	0.0000	22.9130	.4402	.1553
20.0	18.9419	.3640	0.0000	22.9536	.4410	.3148
30.0	18.9419	.3640	0.0000	23.0229	.4423	.4809
40.0	18.9419	.3640	0.0000	23.1215	.4442	.6582
50.0	18.9419	.3640	0.0000	23.2526	.4467	.8452
60.0	18.9419	.3640	0.0000	23.4165	.4499	1.0479
70.0	18.9419	.3640	0.0000	23.6184	.4538	1.2558
80.0	18.9419	.3640	0.0000	23.8549	.4584	1.4708
90.0	18.9419	.3640	0.0000	24.1318	.4637	1.6729
100.0	18.9419	.3640	0.0000	24.4387	.4696	1.8280
110.0	18.9419	.3640	0.0000	24.7699	.4760	1.9449
120.0	18.9419	.3640	0.0000	25.1176	.4826	1.9106
130.0	18.9419	.3640	0.0000	25.4473	.4892	1.7229
140.0	18.9419	.3640	0.0000	25.7190	.4940	1.3042

150.0	18.9419	.3640	0.0000	25.9026	.4971	.5014
160.0	18.9419	.3640	0.0000	25.8940	.4979	-.6586
170.0	18.9419	.3640	0.0000	25.6727	.4996	-1.0678
180.0	18.9419	.3640	0.0000	25.5213	.5016	0.0000

SURFACE FLOW VARIABLES AT Z -797.994173
X/L = .079799 DZDT= 91.327918 ITER= 1256

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	290.4461	.6709	2.4012E+01	5.0298E+00	2.3607	.8592	0.0000	2.9733E-01	1.0000	.44204	.00	9.1703E-01
10.0	290.4461	.6618	2.3694E+01	4.9821E+00	2.3675	.8617	.0941	2.9677E-01	1.0000	.44036	.00	9.1703E-01
20.0	290.4461	.6346	2.2787E+01	4.8421E+00	2.3877	.8691	.1679	2.9508E-01	1.0000	.43536	.00	9.1703E-01
30.0	290.4461	.5919	2.1303E+01	4.6175E+00	2.4218	.8815	.2506	2.9229E-01	1.0000	.42717	.00	9.1703E-01
40.0	290.4461	.5368	1.9417E+01	4.3211E+00	2.4701	.8990	.3317	2.8844E-01	1.0000	.41598	.00	9.1703E-01
50.0	290.4461	.4733	1.7233E+01	3.9637E+00	2.5332	.9220	.4106	2.8359E-01	1.0000	.40207	.00	9.1703E-01
60.0	290.4461	.4056	1.4913E+01	3.5793E+00	2.6116	.9505	.4862	2.7777E-01	1.0000	.38579	.00	9.1703E-01
70.0	290.4461	.3379	1.2590E+01	3.1714E+00	2.7059	.9849	.5580	2.7113E-01	1.0000	.36757	.00	9.1703E-01
80.0	290.4461	.2736	1.0386E+01	2.7642E+00	2.8163	1.0250	.6241	2.6378E-01	1.0000	.34791	.00	9.1703E-01
90.0	290.4461	.2155	8.3904E+00	2.3734E+00	2.9429	1.0711	.6835	2.5586E-01	1.0000	.32733	.00	9.1703E-01
100.0	290.4461	.1649	6.6576E+00	2.0119E+00	3.0853	1.1230	.7339	2.4755E-01	1.0000	.30639	.00	9.1703E-01
110.0	290.4461	.1232	5.2252E+00	1.6922E+00	3.2409	1.1796	.7704	2.3913E-01	1.0000	.28590	.00	9.1703E-01
120.0	290.4461	.0899	4.0846E+00	1.4195E+00	3.4065	1.2399	.7887	2.3096E-01	1.0000	.26648	.00	9.1703E-01
130.0	290.4461	.0648	3.2210E+00	1.1978E+00	3.5747	1.3011	.7807	2.2316E-01	1.0000	.24899	.00	9.1703E-01
140.0	290.4461	.0471	2.6166E+00	1.0326E+00	3.7322	1.3584	.7310	2.1663E-01	1.0000	.23484	.00	9.1703E-01
150.0	290.4461	.0367	2.2581E+00	9.2940E-01	3.8571	1.4039	.6141	2.1212E-01	1.0000	.22497	.00	9.1703E-01
160.0	290.4461	.0321	2.0995E+00	8.8240E-01	3.9332	1.4316	.4149	2.0993E-01	1.0000	.22035	.00	9.1703E-01
170.0	290.4461	.0309	2.0592E+00	8.7016E-01	3.9628	1.4423	.1864	2.0934E-01	1.0000	.21912	.00	9.1703E-01
180.0	290.4461	.0307	2.0544E+00	8.6870E-01	3.9684	1.4444	0.0000	2.0927E-01	1.0000	.21897	.00	9.1703E-01

```
MACH =  7.000000
ALPHA = 15.000000
GAMMA = 1.400
SIGMA = 20.00

Z-INITIAL =  797.99
Z-FINAL =  10000.00
PHI-ZERO =  90.00

NIT = 20
NIPHI = 18
METHOD ORDER = 2
NITER = 1500
NPRNT = 0
IPRNT = 1
NCONE = 1
NWAPRT= 0
NREAL = 0

DZ/DT = 91.328 INITIALLY
DELTA-X =  0.000
DELTA-Y =  0.000

DISK1 = 3
DISK2 = 3
TAPE1 = 1
TAPE2 = 1

PERCENT OF MAX. STEPSIZE =  .90
METHOD = 2
BND. COND. = 1
BETA=0.000
OMEGA= 0.000

PINF =     .241555E-03     RHOIN =     .260880E-02     QINF =     .952579E+00

GASCON= 1.7160E+03

K =  3     PHI=  0.000000     UINF=  .920121     VINF=  -.246546     WINF=  0.000000
K =  4     PHI= 10.000000     UINF=  .920121     VINF=  -.242800     WINF=   .042812
K =  5     PHI= 20.000000     UINF=  .920121     VINF=  -.231677     WINF=   .084324
K =  6     PHI= 30.000000     UINF=  .920121     VINF=  -.213515     WINF=   .123273
K =  7     PHI= 40.000000     UINF=  .920121     VINF=  -.188865     WINF=   .158477
K =  8     PHI= 50.000000     UINF=  .920121     VINF=  -.158477     WINF=   .188865
K =  9     PHI= 60.000000     UINF=  .920121     VINF=  -.123273     WINF=   .213515
K = 10     PHI= 70.000000     UINF=  .920121     VINF=  -.084324     WINF=   .231677
K = 11     PHI= 80.000000     UINF=  .920121     VINF=  -.042812     WINF=   .242800
K = 12     PHI= 90.000000     UINF=  .920121     VINF=  -.000000     WINF=   .246546
K = 13     PHI=100.000000     UINF=  .920121     VINF=   .042812     WINF=   .242800
K = 14     PHI=110.000000     UINF=  .920121     VINF=   .084324     WINF=   .231677
K = 15     PHI=120.000000     UINF=  .920121     VINF=   .123273     WINF=   .213515
K = 16     PHI=130.000000     UINF=  .920121     VINF=   .158477     WINF=   .188865
K = 17     PHI=140.000000     UINF=  .920121     VINF=   .188865     WINF=   .158477
K = 18     PHI=150.000000     UINF=  .920121     VINF=   .213515     WINF=   .123273
K = 19     PHI=160.000000     UINF=  .920121     VINF=   .231677     WINF=   .084324
K = 20     PHI=170.000000     UINF=  .920121     VINF=   .242800     WINF=   .042812
K = 21     PHI=180.000000     UINF=  .920121     VINF=   .246546     WINF=   .000000
```

RADIAL MESH DESCRIPTION

J= 3	TAU= 0.	XI = 0.	TXI = .1000E+01	TXIT = 0.
J= 4	TAU= .4762E-01	XI = .4762E-01	TXI = .1000E+01	TXIT = 0.
J= 5	TAU= .9524E-01	XI = .9524E-01	TXI = .1000E+01	TXIT = 0.
J= 6	TAU= .1429E+00	XI = .1429E+00	TXI = .1000E+01	TXIT = 0.
J= 7	TAU= .1905E+00	XI = .1905E+00	TXI = .1000E+01	TXIT = 0.
J= 8	TAU= .2381E+00	XI = .2381E+00	TXI = .1000E+01	TXIT = 0.
J= 9	TAU= .2857E+00	XI = .2857E+00	TXI = .1000E+01	TXIT = 0.
J=10	TAU= .3333E+00	XI = .3333E+00	TXI = .1000E+01	TXIT = 0.
J=11	TAU= .3810E+00	XI = .3810E+00	TXI = .1000E+01	TXIT = 0.
J=12	TAU= .4286E+00	XI = .4286E+00	TXI = .1000E+01	TXIT = 0.
J=13	TAU= .4762E+00	XI = .4762E+00	TXI = .1000E+01	TXIT = 0.
J=14	TAU= .5238E+00	XI = .5238E+00	TXI = .1000E+01	TXIT = 0.
J=15	TAU= .5714E+00	XI = .5714E+00	TXI = .1000E+01	TXIT = 0.
J=16	TAU= .6190E+00	XI = .6190E+00	TXI = .1000E+01	TXIT = 0.
J=17	TAU= .6667E+00	XI = .6667E+00	TXI = .1000E+01	TXIT = 0.
J=18	TAU= .7143E+00	XI = .7143E+00	TXI = .1000E+01	TXIT = 0.
J=19	TAU= .7619E+00	XI = .7619E+00	TXI = .1000E+01	TXIT = 0.
J=20	TAU= .8095E+00	XI = .8095E+00	TXI = .1000E+01	TXIT = 0.
J=21	TAU= .8571E+00	XI = .8571E+00	TXI = .1000E+01	TXIT = 0.
J=22	TAU= .9048E+00	XI = .9048E+00	TXI = .1000E+01	TXIT = 0.
J=23	TAU= .9524E+00	XI = .9524E+00	TXI = .1000E+01	TXIT = 0.
J=24	TAU= .1000E+01	XI = .1000E+01	TXI = .1000E+01	TXIT = 0.

MERIDIANOL MESH DESCRIPTION

K= 2	ETA= -.1745E+00	PHI= -.1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 3	ETA= 0.	PHI= 0.	DTIL= .1000E+01	DTILE= 0.
K= 4	ETA= .1745E+00	PHI= .1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 5	ETA= .3491E+00	PHI= .3491E+00	DTIL= .1000E+01	DTILE= 0.
K= 6	ETA= .5236E+00	PHI= .5236E+00	DTIL= .1000E+01	DTILE= 0.
K= 7	ETA= .6981E+00	PHI= .6981E+00	DTIL= .1000E+01	DTILE= 0.
K= 8	ETA= .8727E+00	PHI= .8727E+00	DTIL= .1000E+01	DTILE= 0.
K= 9	ETA= .1047E+01	PHI= .1047E+01	DTIL= .1000E+01	DTILE= 0.
K=10	ETA= .1222E+01	PHI= .1222E+01	DTIL= .1000E+01	DTILE= 0.
K=11	ETA= .1396E+01	PHI= .1396E+01	DTIL= .1000E+01	DTILE= 0.
K=12	ETA= .1571E+01	PHI= .1571E+01	DTIL= .1000E+01	DTILE= 0.
K=13	ETA= .1745E+01	PHI= .1745E+01	DTIL= .1000E+01	DTILE= 0.
K=14	ETA= .1920E+01	PHI= .1920E+01	DTIL= .1000E+01	DTILE= 0.
K=15	ETA= .2094E+01	PHI= .2094E+01	DTIL= .1000E+01	DTILE= 0.
K=16	ETA= .2269E+01	PHI= .2269E+01	DTIL= .1000E+01	DTILE= 0.
K=17	ETA= .2443E+01	PHI= .2443E+01	DTIL= .1000E+01	DTILE= 0.
K=18	ETA= .2618E+01	PHI= .2618E+01	DTIL= .1000E+01	DTILE= 0.
K=19	ETA= .2793E+01	PHI= .2793E+01	DTIL= .1000E+01	DTILE= 0.
K=20	ETA= .2967E+01	PHI= .2967E+01	DTIL= .1000E+01	DTILE= 0.
K=21	ETA= .3142E+01	PHI= .3142E+01	DTIL= .1000E+01	DTILE= 0.
K=22	ETA= .3316E+01	PHI= -.2967E+01	DTIL= .1000E+01	DTILE= 0.

SURFACE FLOW VARIABLES AT Z =797.994173
X/L = .079799 DZDT= 91.828467 ITER= 1256

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	M/MT	TEMP	(S-S.INF)/CV
0.0	290.9461	.6709	2.4012E+01	5.0298E+00	2.3607	.8592	0.0000	2.9735E-01	1.0000	.44204	.00	9.1703E-01
10.0	290.9461	.6616	2.3694E+01	4.9821E+00	2.3675	.8617	.0841	2.9677E-01	1.0000	.44036	.00	9.1703E-01
20.0	290.9461	.6348	2.2767E+01	4.8421E+00	2.3877	.8691	.1679	2.9505E-01	1.0000	.43536	.00	9.1703E-01
30.0	290.9461	.5919	2.1303E+01	4.6175E+00	2.4218	.8815	.2506	2.9226E-01	1.0000	.42717	.00	9.1703E-01
40.0	290.9461	.5368	1.9413E+01	4.3211E+00	2.4701	.8990	.3317	2.8854E-01	1.0000	.41598	.00	9.1703E-01
50.0	290.9461	.4733	1.7233E+01	3.9687E+00	2.5332	.9220	.4106	2.8357E-01	1.0000	.40207	.00	9.1703E-01
60.0	290.9461	.4056	1.4913E+01	3.5793E+00	2.6116	.9505	.4862	2.7777E-01	1.0000	.38579	.00	9.1703E-01
70.0	290.9461	.3379	1.2550E+01	3.1714E+00	2.7059	.9849	.5580	2.7113E-01	1.0000	.36757	.00	9.1703E-01
80.0	290.9461	.2736	1.0355E+01	2.7642E+00	2.8163	1.0250	.6241	2.6378E-01	1.0000	.34791	.00	9.1703E-01
90.0	290.9461	.2155	8.3404E+00	2.3734E+00	2.9429	1.0711	.6835	2.5586E-01	1.0000	.32733	.00	9.1703E-01
100.0	290.9461	.1649	6.6576E+00	2.0119E+00	3.0853	1.1230	.7339	2.4755E-01	1.0000	.30639	.00	9.1703E-01
110.0	290.9461	.1232	5.2252E+00	1.6922E+00	3.2409	1.1796	.7704	2.3913E-01	1.0000	.28590	.00	9.1703E-01
120.0	290.9461	.0899	4.0046E+00	1.4195E+00	3.4065	1.2399	.7887	2.3086E-01	1.0000	.26648	.00	9.1703E-01
130.0	290.9461	.0648	3.2210E+00	1.1978E+00	3.5747	1.3011	.7807	2.2316E-01	1.0000	.24899	.00	9.1703E-01
140.0	290.9461	.0471	2.6100E+00	1.0326E+00	3.7322	1.3584	.7310	2.1655E-01	1.0000	.23464	.00	9.1703E-01
150.0	290.9461	.0367	2.2581E+00	9.2640E-01	3.8571	1.4039	.6191	2.1212E-01	1.0000	.22497	.00	9.1703E-01
160.0	290.9461	.0321	2.0991E+00	8.8240E-01	3.9332	1.4316	.4149	2.0995E-01	1.0000	.22035	.00	9.1703E-01
170.0	290.9461	.0309	2.0592E+00	8.7016E-01	3.9628	1.4423	.1864	2.0934E-01	1.0000	.21912	.00	9.1703E-01
180.0	290.9461	.0307	2.0544E+00	8.6870E-01	3.9684	1.4444	0.0000	2.0927E-01	1.0000	.21897	.00	9.1703E-01

K= 3 PHI = 0.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
31092.26296076	5.8005E-03	1.3121E-02	.70192138	.25547849	0.00000000	.91703047	.29733386	0.0000	.9420
41103.12979391	5.7988E-03	1.3119E-02	.70319946	.25202113	0.00000000	.91702521	.29732235	.0476	.9420
51113.96627206	5.7957E-03	1.3114E-02	.70446865	.24857460	0.00000000	.91702521	.29729939	.0952	.9419
61124.88346021	5.7906E-03	1.3106E-02	.70574906	.24513919	0.00000000	.91702521	.29726253	.1429	.9418
71135.73029336	5.7835E-03	1.3094E-02	.70703527	.24172402	0.00000000	.91702521	.29721057	.1905	.9417
81146.59712651	5.7745E-03	1.3080E-02	.70832715	.23832127	0.00000000	.91702521	.29714915	.2381	.9415
91157.46395965	5.7635E-03	1.3062E-02	.70962511	.23494511	0.00000000	.91702521	.29706329	.2857	.9412
101169.33079280	5.7506E-03	1.3041E-02	.71092973	.23157854	0.00000000	.91702521	.29696811	.3333	.9410
111179.19762595	5.7358E-03	1.3017E-02	.71224169	.22822460	0.00000000	.91702521	.29685365	.3810	.9406
121190.06445910	5.7191E-03	1.2990E-02	.71356174	.22489107	0.00000000	.91702521	.29673495	.4286	.9403
131200.93129225	5.7005E-03	1.2960E-02	.71489078	.22157455	0.00000000	.91702521	.29659695	.4762	.9398
141211.79812540	5.6800E-03	1.2926E-02	.71622978	.21827548	0.00000000	.91702521	.29644457	.5238	.9394
151222.66495855	5.6577E-03	1.2890E-02	.71757978	.21498820	0.00000000	.91702521	.29627768	.5714	.9389
161233.53179170	5.6334E-03	1.2851IE-02	.71894191	.21156086	0.00000000	.91702521	.29609611	.6190	.9384

171244.39862485	5.60736E-03	1.28085E-02	.72031743	.20823047	0.00000000	.91702521	.29589960	.6667	.4378
181255.26545800	5.57933E-03	1.27628E-02	.72170767	.20489388	0.00000000	.91702521	.29568786	.7143	.4372
191266.13229115	5.54937E-03	1.27139E-02	.72311413	.20154763	0.00000000	.91702521	.29546049	.7619	.4365
201276.99912430	5.51745E-03	1.26615E-02	.72453829	.19818828	0.00000000	.91702521	.29521710	.8095	.4358
211287.86555745	5.48350E-03	1.26058E-02	.72599251	.19481110	0.00000000	.91702521	.29495696	.8571	.4350
221298.73279060	5.44758E-03	1.25468E-02	.72744657	.19141471	0.00000000	.91702521	.29468013	.9048	.4342
231309.59962375	5.40929E-03	1.24837E-02	.72894039	.18798452	0.00000000	.91702521	.29438336	.9524	.4333
241320.46645690	5.36965E-03	1.24183E-02	.73044069	.18454858	0.00000000	.91702521	.29407422	1.0000	.4324

K= 4 PHI = 10.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
	31092.26296076	5.72347E-03	1.29974E-02	.70258673	.25572066	.02496519	.91703047	.29676778	0.0000	.4404
	41103.16693592	5.72251E-03	1.29924E-02	.70375068	.25224781	.02561434	.91739748	.29679861	.0476	.4405
	51114.07091108	5.71994E-03	1.29982E-02	.70518404	.24888630	.02630375	.91783028	.29686749	.0952	.4401
	61124.97488624	5.71555E-03	1.29970E-02	.70654258	.24550954	.02703921	.91584198	.29656659	.1429	.4398
	71135.87886140	5.70915E-03	1.29919E-02	.70789169	.24214938	.02851151	.91511687	.29645915	.1905	.4394
	81146.78283657	5.70090E-03	1.29829E-02	.70922864	.23880222	.02933339	.91463821	.29634702	.2381	.4391
	91157.68681173	5.69073E-03	1.29704E-02	.71058359	.23547651	.03014033	.91419783	.29622484	.2857	.4387
	101168.59078689	5.67869E-03	1.29545E-02	.71186672	.23215212	.03087793	.91379746	.29609289	.3333	.4384
	111179.49476205	5.65479E-03	1.29354E-02	.71323180	.22884611	.03161204	.91342087	.29594950	.3810	.4379
	121190.39873721	5.64066E-03	1.29130E-02	.71456668	.22555026	.03245574	.91308744	.29579462	.4286	.4375
	131201.30271238	5.63150E-03	1.28874E-02	.71571252	.22226256	.03312196	.91273056	.29562752	.4762	.4370
	141212.20668754	5.61212E-03	1.28588E-02	.71720150	.21898153	.03387362	.91240912	.29544200	.5238	.4364
	151223.11066270	5.59090E-03	1.28267E-02	.71861823	.21570158	.03436944	.91210001	.29525560	.5714	.4359
	161234.01463786	5.56786E-03	1.27917E-02	.71996407	.21242324	.03500369	.91180219	.29505005	.6190	.4353
	171244.91861302	5.54297E-03	1.27534E-02	.72136056	.20914232	.03556647	.91151403	.29483091	.6667	.4346
	181255.82259819	5.51621E-03	1.27119E-02	.72274922	.20585583	.03629859	.91123469	.29459781	.7143	.4339
	191266.72658335	5.48758E-03	1.26672E-02	.72415169	.20255041	.03692109	.91096320	.29435028	.7619	.4332
	201277.63056851	5.45702E-03	1.26192E-02	.72558989	.19925251	.03755436	.91069895	.29408782	.8095	.4324
	211288.53451367	5.42450E-03	1.25677E-02	.72706516	.19592821	.03813993	.91044132	.29380782	.8571	.4316
	221298.43848883	5.38999E-03	1.25120E-02	.72846001	.19258330	.03873866	.91018979	.29351564	.9048	.4308
	231310.34246399	5.35339E-03	1.24543E-02	.72993696	.18923.314	.03935359	.90994433	.29320439	.9524	.4298
	241321.24643916	5.31469E-03	1.23920E-02	.73143730	.18581369	.03990744	.90970316	.29287545	1.0000	.4289

K= 5 PHI = 20.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
	31092.26296076	5.49950E-03	1.28320E-02	.70457174	.25644314	.04953493	.91703047	.29508029	0.0000	.4354
	41103.27663318	5.50014E-03	1.28276E-02	.70655773	.25333584	.05077114	.91266038	.29462999	.0476	.4340
	51114.29030561	5.49819E-03	1.28197E-02	.70834600	.25014794	.05206784	.90949725	.29428510	.0952	.4330
	61125.30397803	5.49663E-03	1.27113E-02	.70972094	.24690106	.05468199	.90750584	.29405627	.1429	.4323
	71136.31765045	5.49228E-03	1.27232E-02	.71115628	.24366842	.05637399	.90574711	.29383019	.1905	.4317
	81147.34132288	5.48613E-03	1.27208E-02	.71254732	.24044255	.05797063	.90424139	.29363348	.2381	.4311
	91158.35699530	5.47829E-03	1.27054E-02	.71342034	.23723198	.05949964	.90284919	.29342752	.2857	.4305
	101169.37265772	5.46873E-03	1.27012E-02	.71527548	.23403448	.06097253	.90157137	.29322047	.3333	.4299
	111180.38834015	5.45747E-03	1.27134E-02	.71662172	.23085063	.06239992	.90036318	.29300769	.3810	.4293
	121191.40401257	5.44452E-03	1.27022E-02	.71798033	.22767824	.06378805	.89922153	.29278589	.4286	.4286
	131202.41968500	5.42988E-03	1.26878E-02	.71909565	.22451590	.06514234	.89812782	.29255208	.4762	.4280
	141213.43535742	5.41350E-03	1.26700E-02	.72012928	.22136122	.06646663	.89707849	.29232681	.5238	.4273
	151224.45102984	5.39550E-03	1.26491E-02	.72196394	.21821.02	.06776414	.89605480	.29208805	.5714	.4266
	161235.46670227	5.37591E-03	1.26250E-02	.72330131	.21506561	.06903740	.89506506	.29182729	.6190	.4258
	171245.48237469	5.35453E-03	1.25977E-02	.72464354	.21191928	.07029853	.89412907	.29156182	.6667	.4250
	181257.49804712	5.33142E-03	1.25571E-02	.72599242	.20877005	.07151929	.89320021	.29128511	.7143	.4242
	191268.51371954	5.30657E-03	1.25334E-02	.72734989	.20561478	.07273114	.89229362	.29099652	.7619	.4234
	201279.52939196	5.27994E-03	1.24963E-02	.72871803	.20244983	.07392539	.89140753	.29069542	.8095	.4225
	211290.54506439	5.25151E-03	1.24559E-02	.73009941	.19927220	.07510299	.89054001	.29038128	.8571	.4216
	221301.56073681	5.22114E-03	1.24120E-02	.73149502	.19607538	.07626534	.88969003	.29005278	.9048	.4207
	231312.57640923	5.18906E-03	1.23646E-02	.73290411	.19286345	.07741183	.88885556	.28971112	.9524	.4197
	241323.59208166	5.15432E-03	1.23128E-02	.73434831	.18960342	.07854746	.88803787	.28934872	1.0000	.4186

K= 6 PHI = 30.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT

31092.26296076	5.14579E-03	1.20462E-02	.70787184	.25784428	.07325329	.91703047	.29229124	0.0000	.4272
41103.46958896	5.14885E-03	1.21593E-02	.71122024	.25514499	.07494908	.90494325	.29101527	.0476	.4234
51114.67421717	5.15038E-03	1.22198E-02	.71330006	.25223378	.07788299	.89800991	.29034939	.0952	.4215
61125.87984537	5.15090E-03	1.22554E-02	.71494971	.24919824	.08047573	.89385808	.28992096	.1429	.4203
71137.08647357	5.14628E-03	1.22855E-02	.71651688	.24616977	.08285722	.89017263	.28952898	.1905	.4191
81148.29110178	5.14647E-03	1.23055E-02	.71798704	.24314094	.08516994	.88700697	.28917924	.2381	.4181
91159.49672998	5.14217E-03	1.23270E-02	.71941588	.24012767	.08735757	.88407255	.28884188	.2857	.4171
101170.70235818	5.13640E-03	1.23409E-02	.72080163	.23712722	.08946784	.88137359	.28851732	.3333	.4162
111181.90798639	5.12917E-03	1.23510E-02	.72216170	.23414262	.09151361	.87881781	.28819610	.3810	.4153
121193.11361459	5.12049E-03	1.23574E-02	.72349780	.23117164	.09350467	.87639911	.28787757	.4286	.4144
131204.31924280	5.11038E-03	1.23604E-02	.72481771	.22821383	.09544799	.87407944	.28755779	.4762	.4134
141215.52487100	5.09877E-03	1.23600E-02	.72612369	.22526692	.09734909	.87185128	.28723592	.5238	.4125
151226.73049920	5.08573E-03	1.23564E-02	.72742007	.22232916	.09921237	.86969546	.28690998	.5714	.4116
161237.93612741	5.07128E-03	1.23495E-02	.72870917	.21939804	.10104144	.86760839	.28657916	.6190	.4106
171249.14175561	5.05542E-03	1.23397E-02	.72999397	.21647112	.10283926	.86557735	.28624226	.6667	.4097
181260.34738381	5.03777E-03	1.23258E-02	.73127673	.21354559	.10461832	.86359816	.28589849	.7143	.4087
191271.55301202	5.01877E-03	1.23104E-02	.73255934	.21061863	.10635070	.86166503	.28554699	.7619	.4077
201282.75864022	4.99820E-03	1.22909E-02	.73384588	.20768653	.10806829	.85977422	.28518687	.8095	.4067
211293.96426843	4.97608E-03	1.22683E-02	.73513607	.20474748	.10976243	.85792171	.28481771	.8571	.4056
221305.16989663	4.95219E-03	1.22420E-02	.73643665	.20179230	.11143510	.85610540	.28443739	.9048	.4045
231316.37552483	4.92699E-03	1.22131E-02	.73773792	.19883409	.11308576	.85432081	.28404907	.9524	.4034
241327.58115304	4.89886E-03	1.21784E-02	.73907957	.19581589	.11472006	.85257119	.28363950	1.0000	.4023

K= 7 PHI = 40.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	4.68926E-03	1.12728E-02	.71247322	.25931934	.09567938	.91703047	.28843751	0.0000	.4160
41103.73971941	4.69521E-03	1.13768E-02	.71762483	.25763501	.09764794	.89319335	.28604324	.0476	.4091
51115.21647807	4.69978E-03	1.15761E-02	.72070421	.25503249	.10121768	.88209387	.28495217	.0952	.4060
61126.69323673	4.70339E-03	1.16417E-02	.72213638	.25234519	.10441163	.87495157	.28425741	.1429	.4040
71138.16999538	4.70570E-03	1.16807E-02	.72312197	.24959598	.10741187	.86862594	.28353656	.1905	.4022
81149.64675404	4.70699E-03	1.17484E-02	.72530678	.24683578	.11026940	.86318443	.28309629	.2381	.4007
91161.12351270	4.70703E-03	1.17888E-02	.72669643	.24409110	.11297380	.85814285	.28255735	.2857	.3993
101172.60027135	4.70590E-03	1.18259E-02	.72831948	.24135859	.11561091	.85350750	.28211022	.3333	.3979
111184.07703001	4.70361E-03	1.18684E-02	.72969473	.23864470	.11817962	.84911904	.28164881	.3810	.3966
121195.55378867	4.70016E-03	1.18879E-02	.73102412	.23594705	.12068239	.84496887	.28120217	.4286	.3954
131207.03054732	4.69555E-03	1.19134E-02	.73232043	.23326661	.12309453	.84098972	.28076350	.4762	.3941
141218.50730598	4.68979E-03	1.19355E-02	.73358645	.23060119	.12547933	.83717021	.28033157	.5238	.3929
151229.98406464	4.68288E-03	1.19547E-02	.73482897	.22794972	.12781558	.83347775	.27990301	.5714	.3917
161241.46082329	4.67476E-03	1.19701E-02	.73605089	.22530937	.13010994	.82990193	.27947664	.6190	.3905
171252.93758195	4.66547E-03	1.19811E-02	.73725646	.22267984	.13236579	.82642519	.27905053	.6667	.3893
181264.41434061	4.65497E-03	1.19881E-02	.73844849	.22005638	.13456831	.82305908	.27862360	.7143	.3882
191275.89109925	4.64331E-03	1.19908E-02	.73962999	.21743779	.13671598	.81973519	.27819480	.7619	.3870
201287.36785792	4.63034E-03	1.20000E-02	.74080421	.21482000	.13883119	.81650116	.27776235	.8095	.3858
211298.84461657	4.61600E-03	1.20037E-02	.74197194	.21220275	.14105953	.81333592	.27732647	.8571	.3845
221310.32137523	4.60024E-03	1.20009E-02	.74314177	.20957411	.14316156	.81023373	.27688401	.9048	.3833
231321.79813389	4.58359E-03	1.19930E-02	.74429924	.20695497	.14523675	.80718718	.27643971	.9524	.3821
241333.27489254	4.56408E-03	1.19850E-02	.74549456	.20427319	.14729114	.80419982	.27597668	1.0000	.3808

K= 8 PHI = 50.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	4.16288E-03	1.03537E-02	.71834342	.26145562	.11642986	.91703047	.28357285	0.0000	.4021
41104.09912909	4.17184E-03	1.05559E-02	.72559262	.26074174	.11841567	.87890580	.27982381	.0476	.3915
51115.93529742	4.17961E-03	1.08003E-02	.72876187	.25866231	.12252549	.86192548	.27820593	.0952	.3870
61127.77146575	4.18679E-03	1.08994E-02	.73095606	.25627434	.12594139	.85097363	.27718783	.1429	.3842
71139.60763408	4.19311E-03	1.09803E-02	.73248921	.25386973	.12934189	.84133544	.27629406	.1905	.3817
81151.44380241	4.19855E-03	1.10611E-02	.73458503	.25144198	.13269529	.83303825	.27552867	.2381	.3798
91163.27997074	4.20330E-03	1.11304E-02	.73716304	.24902810	.13573320	.82537604	.27481928	.2857	.3776
101175.11613905	4.20702E-03	1.11951E-02	.73962597	.24662196	.13875331	.81855786	.27416458	.3333	.3758
111186.95230741	4.21001E-03	1.12589E-02	.74201329	.24424502	.14169646	.81188826	.27354190	.3810	.3741
121198.78847574	4.21216E-03	1.13076E-02	.74432941	.24188554	.14456490	.80540602	.27294876	.4286	.3725
131210.62464407	4.21348E-03	1.13589E-02	.74659174	.23954575	.14737145	.79939344	.27237553	.4762	.3709
141222.46081240	4.21398E-03	1.14067E-02	.74880465	.23722384	.15011844	.79362933	.27182000	.5238	.3694
151234.29698073	4.21365E-03	1.14515E-02	.74397733	.23492343	.15281265	.78806544	.27127735	.5714	.3680

161246.13314906	4.21248E-03	1.14933E-02	.74511370	.23264052	.15545941	.78268947	.27074576	.6190	.3665
171257.96931739	4.21046E-03	1.15323E-02	.74621936	.23037360	.15806226	.77745985	.27022250	.6667	.3651
181269.80548572	4.20756E-03	1.15686E-02	.74729790	.22812084	.16062486	.77237814	.26970601	.7143	.3637
191281.64165406	4.20379E-03	1.16021E-02	.74835295	.22587678	.16314986	.76742327	.26919464	.7619	.3623
201293.47782239	4.19900E-03	1.16330E-02	.74939864	.22364514	.16564009	.76259523	.26868676	.8095	.3610
211305.31399072	4.19348E-03	1.16612E-02	.75040533	.22142183	.16809725	.75785504	.26818202	.8571	.3596
221317.15015905	4.18668E-03	1.16863E-02	.75141367	.21919160	.17052434	.75322043	.26767666	.9048	.3583
231328.98632738	4.17941E-03	1.17098E-02	.75239558	.21698340	.17292100	.74867694	.26717632	.9524	.3569
241340.82249571	4.16969E-03	1.17276E-02	.75340677	.21472029	.17529297	.74422418	.26666302	1.0000	.3555

K= 9 PHI = 60.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	3.60231E-03	9.33745E-03	.72543162	.26403552	.13506581	.91703047	.27777381	0.0000	.3858
41104.55039065	3.61397E-03	9.73815E-03	.73502273	.26442731	.13676531	.86143839	.27243900	.0476	.3711
51116.83752054	3.62474E-03	9.92777E-03	.73830622	.26297910	.14071643	.83741429	.27032622	.0952	.3651
61129.12480043	3.63529E-03	1.00581E-02	.74131841	.26089954	.14455485	.82204387	.26885799	.1429	.3614
71141.41208032	3.64522E-03	1.01786E-02	.74360528	.25889444	.14817081	.80846009	.26766359	.1905	.3582
81153.69936022	3.65470E-03	1.02796E-02	.74572452	.25685037	.15166380	.79694324	.26665233	.2381	.3555
91165.98664011	3.66375E-03	1.03772E-02	.74892291	.25481944	.15502771	.78611134	.26572542	.2857	.3530
101178.27392060	3.67216E-03	1.04677E-02	.74848174	.25278377	.15829794	.77627434	.26488097	.3333	.3508
111190.56119979	3.68015E-03	1.05574E-02	.74957513	.25080203	.16147763	.76700280	.26408734	.3810	.3487
121202.84847978	3.68765E-03	1.06351E-02	.75116868	.24882773	.16458337	.75826496	.26334111	.4286	.3467
131215.13575967	3.69467E-03	1.07137E-02	.75218567	.24687975	.16761946	.74992214	.26262898	.4762	.3449
141227.42303957	3.70121E-03	1.07881E-02	.75353194	.24495669	.17059501	.74194305	.26194778	.5238	.3431
151239.71031946	3.70725E-03	1.08601E-02	.75461944	.24305897	.17351396	.73429960	.26129093	.5714	.3414
161251.99759935	3.71282E-03	1.09285E-02	.75555333	.24119500	.17638195	.72684592	.26065581	.6190	.3397
171264.28487924	3.71789E-03	1.09954E-02	.75664065	.23933187	.17920228	.71986447	.26003875	.6667	.3381
181276.57215913	3.72243E-03	1.10609E-02	.75753595	.23750342	.18197881	.71269522	.25943761	.7143	.3365
191288.85943902	3.72647E-03	1.11237E-02	.75849351	.23569276	.18471418	.70591521	.25885023	.7619	.3350
201301.14671892	3.72992E-03	1.11863E-02	.75936845	.23389760	.18741141	.69930355	.25827444	.8095	.3335
211313.43399881	3.73289E-03	1.12412E-02	.76021094	.23212103	.19007228	.69286254	.25770979	.8571	.3321
221325.72127870	3.73550E-03	1.12966E-02	.76105276	.23034798	.19269786	.68656419	.25715198	.9048	.3306
231338.00855859	3.73707E-03	1.13500E-02	.76181745	.22860473	.19529442	.68040104	.25660637	.9524	.3292
241350.29583848	3.73733E-03	1.14004E-02	.76261167	.22682435	.19786026	.67437027	.25605682	1.0000	.3278

K=10 PHI = 70.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	3.04114E-03	8.27365E-03	.73365014	.26702681	.15127516	.91703047	.27113484	0.0000	.3676
41105.10274873	3.05492E-03	8.76161E-03	.74563875	.26858700	.15235607	.89132510	.26907253	.0476	.3487
51117.94253669	3.06815E-03	8.99197E-03	.75021874	.26761345	.15603948	.87931112	.26123158	.0952	.3412
61130.78232466	3.08135E-03	9.15788E-03	.75340571	.26610171	.15981884	.78865048	.25947016	.1429	.3366
71143.62211263	3.09435E-03	9.30108E-03	.75598644	.26454384	.16346218	.77050048	.25794883	.1905	.3327
81156.46190060	3.10715E-03	9.43283E-03	.75733603	.26292620	.16701401	.75500879	.25667693	.2381	.3294
91169.30168856	3.11977E-03	9.55635E-03	.75907835	.26131774	.17044568	.74077708	.25552353	.2857	.3265
101182.14147653	3.13220E-03	9.67274E-03	.76060779	.25971511	.17379997	.72780219	.25448671	.3333	.3238
111194.98126450	3.14440E-03	9.78455E-03	.76199935	.25813803	.17706488	.71561727	.25352509	.3810	.3214
121207.82105247	3.15655E-03	9.89104E-03	.76325876	.25656507	.18026033	.70418737	.25252873	.4286	.3191
131220.66084044	3.16743E-03	9.99762E-03	.76441778	.25501273	.18339459	.69331219	.25178507	.4762	.3170
141233.50062840	3.17882E-03	1.00788E-02	.76548288	.25346989	.18644763	.68295362	.25098826	.5238	.3150
151246.34041637	3.18987E-03	1.01853E-02	.76647018	.25210833	.18945133	.67301278	.25023911	.5714	.3131
161259.18020434	3.20034E-03	1.02915E-02	.76733558	.25067676	.19240174	.66345663	.24950435	.6190	.3113
171272.01999231	3.21066E-03	1.03853E-02	.76823028	.24927518	.19530108	.65423067	.24880890	.6667	.3095
181284.85978028	3.22581E-03	1.04779E-02	.76903353	.24790160	.19815346	.64530858	.24814005	.7143	.3079
191297.69956824	3.23581E-03	1.05665E-02	.76977667	.24655602	.20096113	.63665743	.24749490	.7619	.3063
201310.53935621	3.24759E-03	1.06574E-02	.77047347	.24523431	.20372719	.62825705	.24687081	.8095	.3047
211323.37914418	3.25827E-03	1.07450E-02	.77112480	.24393997	.20645361	.62008545	.24626682	.8571	.3032
221336.21893215	3.26858E-03	1.08306E-02	.77174155	.24266029	.20914287	.61212802	.24567875	.9048	.3018
231349.05872011	3.27897E-03	1.09158E-02	.77231249	.24141465	.21179696	.60436789	.24510998	.9524	.3004
241361.89850808	3.28850E-03	1.09975E-02	.77286934	.24015927	.21441681	.59679618	.24454936	1.0000	.2990

K=11 PHI = 80.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT

31092.26296076	2.50879E-03	7.21112E-03	.74288185	.27036688	.16465480	.91703047	.26378260	0.0000	.3479
41105.75441797	2.52398E-03	7.77044E-03	.75726394	.27315199	.16472546	.81844036	.25487441	.0476	.3248
51119.24587518	2.53875E-03	8.03922E-03	.76265051	.27282169	.16774116	.77670851	.25131471	.0952	.3158
61132.73733239	2.55375E-03	8.22858E-03	.76578113	.27180558	.17131784	.75007601	.24913899	.1429	.3104
71146.22878960	2.56884E-03	8.40087E-03	.76836608	.27070421	.17478550	.72688765	.24729854	.1905	.3058
81159.72024681	2.58397E-03	8.55526E-03	.77042411	.26952344	.17824219	.70726647	.24577776	.2381	.3020
91173.21170402	2.59919E-03	8.70177E-03	.77221554	.26834522	.18159541	.68936617	.24441649	.2857	.2987
101186.70316123	2.61449E-03	8.84031E-03	.77375078	.26717050	.18488722	.67312033	.24320624	.3333	.2957
111200.19461844	2.62986E-03	8.97427E-03	.77511643	.26602309	.18809255	.65793650	.24209396	.3810	.2930
121213.68607565	2.64533E-03	9.10379E-03	.77632170	.26490283	.19123213	.64375408	.24107317	.4286	.2906
131227.17753286	2.66102E-03	9.23034E-03	.77740436	.26381799	.19428880	.63031695	.24012101	.4762	.2883
141240.66899007	2.67678E-03	9.35412E-03	.77837244	.26276798	.19731383	.61757316	.23923233	.5238	.2862
151254.16044728	2.69263E-03	9.47564E-03	.77924518	.26175550	.20024611	.60539479	.23839568	.5714	.2842
161267.65190449	2.70873E-03	9.59570E-03	.78002935	.26077863	.20313246	.59373938	.23760699	.6190	.2823
171281.14336170	2.72493E-03	9.71408E-03	.78073594	.25984090	.20596373	.58253601	.23685689	.6667	.2805
181294.63481891	2.74129E-03	9.83114E-03	.78137054	.25893785	.20874437	.57175234	.23615125	.7143	.2788
191308.12627612	2.75781E-03	9.94711E-03	.78193986	.25807043	.21147619	.56134458	.23547719	.7619	.2772
201321.61773333	2.77448E-03	1.00621E-02	.78244917	.25723616	.21416227	.55128716	.23483500	.8095	.2757
211335.10919054	2.79134E-03	1.01763E-02	.78290206	.25643577	.21680468	.54155107	.23422242	.8571	.2743
221348.60064774	2.80831E-03	1.02895E-02	.78330470	.25566463	.21940566	.53211594	.23363568	.9048	.2729
231362.09210495	2.82548E-03	1.04021E-02	.78365726	.25492263	.22198839	.52296165	.23307672	.9524	.2716
241375.58356216	2.84272E-03	1.05140E-02	.78396799	.25421175	.22449116	.51407088	.23254002	1.0000	.2704

K=12 PHI = 90.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	2.02675E-03	6.19174E-03	.75297969	.27406220	.17487440	.91703047	.25586342	0.0000	.3273
41106.51218838	2.04223E-03	6.80613E-03	.76974315	.27804850	.17357108	.79219157	.24997249	.0476	.3001
51120.76141601	2.05784E-03	7.10208E-03	.77582750	.27852440	.17571342	.74028173	.24072890	.0952	.2898
61135.01064363	2.07365E-03	7.31016E-03	.77920532	.27777419	.17893321	.70744215	.23619777	.1429	.2837
71149.25987126	2.08978E-03	7.50123E-03	.78196274	.27712251	.18201362	.67906919	.23604747	.1905	.2786
81163.50909888	2.10612E-03	7.67351E-03	.78411085	.27637814	.18525350	.65508598	.23429317	.2381	.2745
91177.75832651	2.12277E-03	7.83408E-03	.78595167	.27563349	.18835912	.63322877	.23273461	.2857	.2708
101192.00755414	2.13969E-03	7.99459E-03	.78749454	.27489032	.19140689	.61349769	.23136266	.3333	.2676
111206.25678176	2.15694E-03	8.14682E-03	.78883650	.2741.529	.19441447	.59514710	.23011508	.3810	.2648
121220.50600939	2.17451E-03	8.29431E-03	.78999360	.27348872	.19734502	.57810818	.22898427	.4286	.2622
131234.75523701	2.19249E-03	8.43924E-03	.79100299	.27284045	.20020421	.56208585	.22794325	.4762	.2598
141249.00446464	2.21079E-03	8.58158E-03	.79187611	.27223309	.20300371	.54695628	.22698568	.5238	.2576
151263.25369226	2.22940E-03	8.72217E-03	.79263473	.27166208	.20573896	.53261900	.22609794	.5714	.2556
161277.50291989	2.24845E-03	8.86113E-03	.79328769	.27113145	.20841666	.51900907	.22527461	.6190	.2537
171291.75214751	2.26760E-03	8.99857E-03	.79384671	.27064911	.21103654	.50601784	.22450861	.6667	.2520
181306.00137514	2.28776E-03	9.13567E-03	.79431875	.27020267	.21360254	.49362279	.22379553	.7143	.2504
191320.25060276	2.30802E-03	9.27167E-03	.79471102	.26979414	.21611565	.48175741	.22313048	.7619	.2489
201334.49981039	2.32877E-03	9.40716E-03	.79503200	.26943354	.21857876	.47038295	.22250978	.8095	.2476
211348.74901801	2.34995E-03	9.54234E-03	.79528430	.26910906	.22099349	.45945981	.22193020	.8571	.2463
221362.99822564	2.37154E-03	9.67723E-03	.79547458	.26882196	.22336215	.44895702	.22138848	.9048	.2451
231377.24743327	2.39363E-03	9.81213E-03	.79560512	.26857431	.22568663	.43884561	.22088272	.9524	.2439
241391.49674089	2.41611E-03	9.94687E-03	.79568298	.26836008	.22796884	.42910052	.22040947	1.0000	.2429

K=13 PHI =100.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	1.60831E-03	5.24877E-03	.76375443	.27798388	.18167908	.91703047	.24754670	0.0000	.3064
41107.35553856	1.62323E-03	5.89445E-03	.78264227	.28311000	.17870983	.76390365	.23488387	.0476	.2754
51122.44811636	1.63863E-03	6.21076E-03	.78944506	.28399184	.17968727	.70016743	.22971183	.0952	.2638
61137.54069416	1.65419E-03	6.43527E-03	.79316159	.28396512	.18227738	.65990329	.22673813	.1429	.2571
71152.63327196	1.67021E-03	6.64210E-03	.79614506	.28373330	.18488454	.62568417	.22426153	.1905	.2515
81167.72584977	1.68681E-03	6.82970E-03	.79841591	.28341180	.18769342	.59626295	.22225905	.2381	.2470
91182.81842757	1.70351E-03	7.00538E-03	.80011227	.28307079	.19053220	.57015667	.22050942	.2857	.2431
101197.91100537	1.72078E-03	7.17591E-03	.80156436	.28271854	.19331267	.54696120	.21859782	.3333	.2398
111213.00358317	1.73853E-03	7.34074E-03	.80316239	.28238623	.19578622	.52546134	.21764923	.3810	.2369
121228.09616097	1.75676E-03	7.49924E-03	.80494483	.28207765	.19840511	.50584879	.21645224	.4286	.2343
131243.18873878	1.77549E-03	7.65535E-03	.80515599	.28180531	.20095338	.48760898	.21537286	.4762	.2319
141258.28131658	1.79474E-03	7.80860E-03	.80590783	.28157.57	.20344208	.47064559	.21440212	.5238	.2298

A

151273.37389438	1.81453E-03	7.95994E-03	.80652821	.28138116	.20586161	.45473909	.21352184	.5714	.2280
161288.46647218	1.83490E-03	8.10969E-03	.80702809	.28125695	.20821763	.43980818	.21272522	.6190	.2263
171303.55904098	1.85587E-03	8.25854E-03	.80741868	.28114220	.21050725	.42570672	.21200040	.6667	.2247
181318.65162778	1.87743E-03	8.40666E-03	.80771403	.28109638	.21273480	.41237336	.21134180	.7143	.2233
191333.74420559	1.89962E-03	8.55445E-03	.80792200	.28110116	.21490071	.39972210	.21074243	.7619	.2221
201348.83678339	1.92243E-03	8.70210E-03	.80809915	.28115544	.21700786	.38770258	.21019790	.8095	.2209
211363.92936119	1.94589E-03	8.84990E-03	.80810186	.28125973	.21905882	.37625548	.20970340	.8571	.2199
221379.02193899	1.97002E-03	8.99802E-03	.80808534	.28141336	.22105442	.36534082	.20925561	.9048	.2189
231394.11451679	1.99479E-03	9.14656E-03	.80800511	.28161380	.22300015	.35491366	.20885029	.9524	.2181
241409.20709459	2.02033E-03	9.29599E-03	.80786240	.28186631	.22489267	.34494439	.20848646	1.0000	.2173

K=14 PHI =110.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.28296076	1.26213E-03	4.41455E-03	.77498133	.28207014	.18422596	.91703047	.23912389	0.0000	.2859
41108.26687619	1.27575E-03	5.08108E-03	.79602455	.28830076	.17930296	.73090094	.22408839	.0476	.2511
51124.27079161	1.29011E-03	5.41311E-03	.80356942	.28773450	.17890516	.65347836	.21832594	.0952	.2383
61140.27470704	1.30480E-03	5.64778E-03	.80756694	.29008833	.18080873	.60592746	.21493841	.1429	.2310
71156.27862247	1.31971E-03	5.86312E-03	.81070189	.29039163	.18265371	.56435973	.21217293	.1905	.2251
81172.28253790	1.33510E-03	6.06500E-03	.81300947	.29024374	.18519626	.53072497	.20996532	.2381	.2205
91188.28645333	1.35121E-03	6.23399E-03	.81460749	.29020769	.18751631	.50095859	.20812280	.2857	.2166
101204.29036875	1.36773E-03	6.41193E-03	.81636604	.29015565	.18982288	.47482503	.20659754	.3333	.2133
111220.29428418	1.38481E-03	6.57831E-03	.81757833	.29011736	.19215970	.45116491	.20517307	.3810	.2105
121236.29819961	1.40245E-03	6.74125E-03	.81854597	.29010807	.19455793	.42978320	.20388094	.4286	.2080
131252.30211504	1.42070E-03	6.89985E-03	.81932806	.29014051	.19651326	.41015008	.20292952	.4762	.2059
141268.30603046	1.43955E-03	7.05543E-03	.81994022	.29021916	.19858701	.39211376	.20200688	.5238	.2040
151284.30994589	1.45900E-03	7.20011E-03	.82041326	.29035110	.20057732	.37539073	.20118999	.5714	.2024
161300.31386132	1.47917E-03	7.36124E-03	.82075831	.29053842	.20249137	.35996394	.20048968	.6190	.2009
171316.31777675	1.49997E-03	7.51204E-03	.82095379	.29078245	.20432710	.34559485	.19983253	.6667	.1997
181332.32169218	1.52145E-03	7.65312E-03	.82112647	.29103729	.20605833	.33180541	.19927224	.7143	.1985
191348.32560760	1.54367E-03	7.81347E-03	.82117065	.29144744	.20771862	.31907562	.19877087	.7619	.1976
201364.32952303	1.56667E-03	7.96429E-03	.82112676	.29187413	.20933770	.30710726	.19834965	.8095	.1967
211380.33343846	1.59025E-03	8.11484E-03	.82101303	.29234726	.21095547	.29582266	.19797397	.8571	.1960
221396.33735389	1.61489E-03	8.26706E-03	.82081553	.29290941	.21244351	.28517010	.19765575	.9048	.1953
231412.34126932	1.63981E-03	8.41843E-03	.82057203	.29347455	.21385382	.27508896	.19737677	.9524	.1948
241428.34518474	1.66635E-03	8.57379E-03	.82023183	.29416540	.21524991	.26554402	.19715676	1.0000	.1944

K=15 PHI =120.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	9.86712E-04	3.70272E-03	.78641166	.28623044	.18205979	.91703047	.23086060	0.0000	.2665
41109.21417219	9.98655E-04	4.38297E-03	.80594342	.29348072	.17509901	.69293872	.21347077	.0476	.2278
51126.16538363	1.01135E-03	4.72442E-03	.81772102	.29535209	.17329600	.60054245	.20691447	.0952	.2141
61143.11659506	1.02399E-03	4.96340E-03	.82165199	.29601298	.17453495	.54388422	.20312990	.1429	.2063
71160.06780650	1.03735E-03	5.17683E-03	.82515944	.29639370	.17606028	.49707783	.20013268	.1905	.2003
81177.01901794	1.05105E-03	5.37105E-03	.82744496	.29659700	.17769174	.45945619	.19783203	.2381	.1957
91193.97022937	1.06455E-03	5.55130E-03	.82936267	.29674705	.17987485	.42675930	.19591310	.2857	.1919
101210.92144080	1.07815E-03	5.72032E-03	.83064861	.29687658	.18184079	.39863401	.19433787	.3333	.1888
111227.87265224	1.09194E-03	5.88276E-03	.83175598	.29702633	.18369085	.37357640	.19299590	.3810	.1862
121244.82386368	1.10581E-03	6.03878E-03	.83260593	.29720048	.18557856	.35133371	.19186518	.4286	.1841
131261.77507511	1.12009E-03	6.19135E-03	.83326512	.29744248	.18750873	.33121579	.19089503	.4762	.1822
141278.72628655	1.13451E-03	6.34055E-03	.83375073	.29773242	.18965051	.31303285	.19007034	.5238	.1806
151295.67749798	1.14917E-03	6.48758E-03	.83409525	.29808429	.19009955	.29641457	.18936371	.5714	.1793
161312.62870942	1.16417E-03	6.63394E-03	.83430826	.29850488	.19147698	.28121587	.18876500	.6190	.1782
171329.57992086	1.17993E-03	6.77717E-03	.83441315	.29898248	.19276227	.26721703	.18825658	.6667	.1772
181346.53113229	1.19638E-03	6.92111E-03	.83441115	.29955164	.19395996	.25430843	.18783311	.7143	.1764
191363.48234373	1.21422E-03	7.05435E-03	.83432560	.30017084	.19507836	.24234103	.18747944	.7619	.1757
201380.43355516	1.23272E-03	7.20874E-03	.83414412	.30088023	.19611415	.23121685	.18719718	.8095	.1752
211397.38476660	1.25504E-03	7.35221E-03	.83390404	.30162439	.19708555	.22084689	.18695677	.8571	.1748
221414.33597803	1.30334E-03	7.49067E-03	.83356421	.30248927	.19797660	.21124509	.18680269	.9048	.1745
231431.28718947	1.33160E-03	7.64279E-03	.83320047	.30334452	.19882141	.20221280	.18667036	.9524	.1742
241448.23840090	1.35694E-03	7.79327E-03	.83271084	.30437340	.19958239	.19376651	.18660994	1.0000	.1741

K=16 PHI =130.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	7.78018E-04	3.12468E-03	.79771585	.29039483	.17423638	.91703047	.22315510	0.0000	.2490
41110.11885106	7.87688E-04	3.81722E-03	.82291010	.29852485	.16510698	.64910638	.20314968	.0476	.2063
51127.97474137	7.98158E-04	4.16813E-03	.83171042	.30071844	.162.8242	.53919837	.19569906	.0952	.1915
61145.83063169	8.08452E-04	4.46635E-03	.83907514	.3015.408	.163.5586	.47420378	.19155910	.1429	.1835
71163.68652198	8.19498E-04	4.61695E-03	.83925974	.30199427	.164.2042	.42291595	.18841357	.1905	.1775
81181.54241229	8.30700E-04	4.79550E-03	.84147863	.30219685	.16579359	.38182094	.18606535	.2381	.1731
91159.3987.260	9.42703E-04	4.98377E-03	.84219600	.3025.081	.167.0694	.34781949	.18417371	.2857	.1696
101217.25413780	8.55044E-04	5.17498E-03	.8.1447419	.3025.978	.168.2182	.31872088	.18266516	.3333	.1668
111235.11002821	8.67647E-04	5.27554E-03	.84568830	.30271125	.17019815	.29516795	.18142978	.3810	.1648
121252.96591352	8.81358E-04	5.49124E-03	.8462.579	.3029.661	.17147700	.27192869	.18042117	.4286	.1628
131270.82183782	8.95330E-04	5.55243E-03	.84875629	.30322787	.1726.615	.25267289	.17958859	.4762	.1613
141288.67775413	9.09993E-04	5.68575E-03	.8478.582	.30358943	.17364035	.23562462	.17891159	.5238	.1600
151306.5336.949	9.25178E-04	5.81659E-03	.84737671	.3040.404	.17453942	.22033651	.17835811	.5714	.1591
161324.38953474	9.41045E-04	5.94571E-03	.84748928	.3045.845	.17552798	.20660019	.17791738	.6190	.1585
171342.24542505	9.57472E-04	6.07350E-03	.84750243	.30514117	.17601043	.19418143	.17756718	.6667	.1577
181360.10131536	9.74710E-04	6.20100E-03	.84746486	.3055.605	.17659242	.18287875	.17730450	.7143	.1572
191377.95720066	9.92419E-04	6.32773E-03	.8472.431	.3060.939	.17708803	.17259418	.17710816	.7619	.1568
201395.81309597	1.01116E-03	6.45511E-03	.8465.143	.30746227	.1774.278	.16315374	.17698565	.8095	.1566
211413.66898528	1.03014E-03	6.58317E-03	.84664370	.3083.367	.17783110	.15448705	.17690218	.8571	.1565
221431.52487658	1.05058E-03	6.71419E-03	.8462.341	.30941756	.17808488	.14651840	.17690078	.9048	.1565
231449.38076689	1.07075E-03	6.84207E-03	.8457.841	.3104.452	.17829310	.13913336	.17691511	.9524	.1565
241467.23665720	1.09310E-03	6.97764E-03	.8451.9846	.31168801	.1784.824	.13232031	.17700682	1.0000	.1567

E-17 PHI =140.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	6.32089E-04	2.69382E-03	.80850817	.29427291	.15834842	.91703047	.21663045	0.0000	.2348
41110.87711105	6.39168E-04	3.41997E-03	.8260.843	.3054.387	.14821347	.59402728	.19333521	.0476	.1869
51129.49126135	6.47077E-04	3.78097E-03	.8452.7039	.3058.1481	.1444.1138	.48584042	.18500845	.0952	.1711
61148.10541165	6.54845E-04	4.01255E-03	.8495.7214	.3063.6919	.145.2948	.39424344	.18063760	.1429	.1631
71166.71956195	6.62950E-04	4.21213E-03	.8538.5897	.3068.7394	.1468.2256	.33884209	.17742088	.1905	.1574
81185.33371224	6.71365E-04	4.37730E-03	.8547.2620	.3069.6673	.1477.8684	.29745069	.17514203	.2381	.1534
91203.94782254	6.80097E-04	4.52845E-03	.8563.0169	.3069.1072	.1490.7080	.26396861	.17337490	.2857	.1503
101222.5620.284	6.89537E-04	4.65534E-03	.8574.4435	.3069.5948	.150.8197	.23679229	.17203154	.3333	.1480
111241.17616313	6.99238E-04	4.78454E-03	.8593.3241	.3069.671	.151.7803	.21384550	.17096819	.3810	.1462
121259.79031343	7.09548E-04	4.90079E-03	.8595.5976	.3072.698	.1521.2668	.19455527	.17014300	.4286	.1447
131278.40446373	7.19910E-04	5.01203E-03	.8562.2557	.3072.4950	.1527.8790	.17789421	.16949115	.4762	.1436
141297.01861402	7.30081E-04	5.11627E-03	.8547.3504	.3075.0450	.1535.0213	.16351654	.16899109	.5238	.1428
151315.6327.432	7.42511E-04	5.22373E-03	.8599.2829	.3078.4547	.1539.6375	.15099542	.16860721	.5714	.1421
161334.24691462	7.54658E-04	5.32069E-03	.8599.9708	.3082.2841	.1538.9566	.13978684	.16832972	.6190	.1417
171352.86104491	7.67245E-04	5.42813E-03	.8569.7753	.3088.3624	.1540.0650	.12990508	.16813560	.6667	.1413
181371.47521521	7.80600E-04	5.53000E-03	.8598.5233	.3091.8941	.1540.6677	.12109602	.16801916	.7143	.1412
191390.08938551	7.94317E-04	5.63125E-03	.8596.9415	.3102.1438	.1539.1328	.11316634	.16796148	.7619	.1411
201408.70351581	8.08056E-04	5.73477E-03	.8593.7086	.3110.6618	.1537.2544	.10602228	.16797348	.8095	.1411
211427.31766610	8.23918E-04	5.83690E-03	.8590.4277	.3119.6648	.1534.6871	.0995.469	.16802109	.8571	.1412
221445.93181640	8.40176E-04	5.94599E-03	.8585.9530	.3130.7525	.1531.5086	.09362647	.16813622	.9048	.1413
231464.54596670	8.56203E-04	6.04812E-03	.8581.5138	.3141.3450	.1527.4948	.08820548	.16828458	.9524	.1416
241483.16011699	8.74206E-04	6.16040E-03	.8575.5568	.3153.3561	.1522.8719	.08326364	.16846794	1.0000	.1419

E-18 PHI =150.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
31092.26296076	5.45450E-04	2.42459E-03	.81816095	.29778623	.1330.6986	.91703047	.21211593	0.0000	.2250
41111.32440515	5.49652E-04	3.22005E-03	.8484.7056	.3052.9435	.1204.5743	.52625930	.18468804	.0476	.1705
51130.38584553	5.54851E-04	3.60977E-03	.8578.7546	.3107.4452	.1172.6179	.37752291	.17535657	.0952	.1537
61149.44728592	5.59547E-04	3.83756E-03	.8620.4126	.3113.5980	.1184.3607	.29970301	.17076770	.1429	.1458
71168.50873031	5.64914E-04	4.01554E-03	.8647.6599	.3113.5930	.1205.5936	.2457.624	.16773709	.1905	.1407
81187.57017270	5.70170E-04	4.15193E-03	.8665.5765	.3111.5998	.1222.4823	.20832001	.16572901	.2381	.1373
91206.63161509	5.75510E-04	4.26850E-03	.8678.8356	.3109.2126	.1235.4956	.1794.1881	.16425820	.2857	.1349
101225.6950.747	5.81557E-04	4.36717E-03	.8688.3600	.3105.2287	.1248.3495	.15726510	.16319662	.3333	.1332
111244.75449986	5.87580E-04	4.45649E-03	.8695.7874	.3102.5503	.1259.0948	.13925540	.16238741	.3810	.1318
121263.81594225	5.93817E-04	4.53725E-03	.8701.2529	.3100.6157	.1259.6525	.1246.7487	.16178786	.4286	.1309
131282.87739464	6.00320E-04	4.61302E-03	.8705.4595	.3099.4241	.1262.9153	.11237260	.16132941	.4762	.1301

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
14	1301.95882702	6.07145E-04	4.68480E-03	.07083896	.30992255	.12644620	.10206138	.16099620	.5238	.1296
15	1321.00026941	6.14250E-04	4.75406E-03	.07104403	.30994921	.12642677	.09314936	.16075153	.5714	.1292
16	1340.06171180	6.21801E-04	4.82209E-03	.07114925	.31027140	.12620975	.08547829	.16059180	.6190	.1289
17	1359.12315419	6.29641E-04	4.88896E-03	.07118816	.31043775	.12590152	.07872425	.16049189	.6667	.1288
18	1378.18459658	6.38093E-04	4.95671E-03	.07113497	.31083710	.12558281	.07279142	.16045755	.7143	.1287
19	1397.24603896	6.46804E-04	5.02795E-03	.07103254	.31130722	.12520377	.06748756	.16046444	.7619	.1287
20	1416.30748135	6.56359E-04	5.09404E-03	.07083239	.31199466	.12449567	.06275636	.16052946	.8095	.1288
21	1435.36892374	6.66071E-04	5.16355E-03	.07060239	.31271434	.12385015	.05846949	.16062057	.8571	.1290
22	1454.43036613	6.76954E-04	5.23811E-03	.07025719	.31347139	.12319325	.05460368	.16077075	.9048	.1292
23	1473.49180852	6.87766E-04	5.31118E-03	.06990956	.31433576	.12225644	.05105533	.16093102	.9524	.1295
24	1492.55325090	7.00216E-04	5.39206E-03	.06941613	.31544650	.12144397	.04783593	.16115859	1.0000	.1299

K=19 PHI =160.0 Z = **********

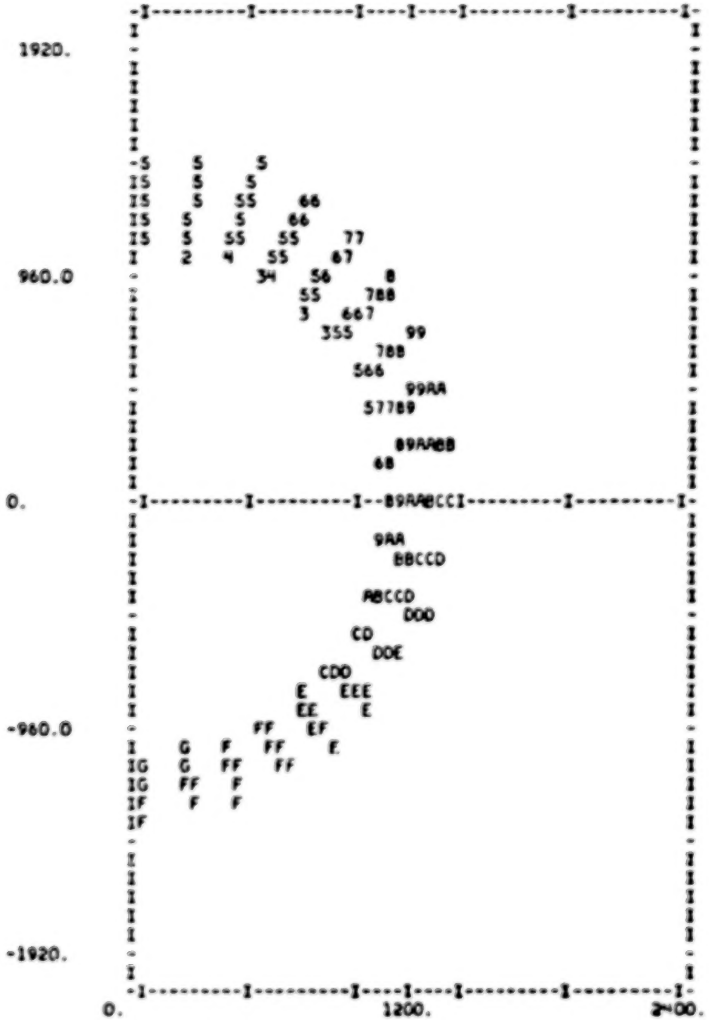
J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1092.26296076	5.07233E-04	2.30200E-03	.02568490	.30052472	.08708835	.91703047	.20992616	0.0000	.2203
4	1111.32224569	5.08647E-04	3.28648E-03	.08070874	.31295828	.08070071	.42135995	.17593734	.0476	.1548
5	1130.38153062	5.11273E-04	3.71579E-03	.08789062	.31518949	.08743005	.25342221	.16581731	.0952	.1375
6	1149.44081555	5.13361E-04	3.95732E-03	.07255235	.31524252	.08401972	.18974701	.16218333	.1429	.1315
7	1168.50010048	5.15728E-04	4.03206E-03	.07460556	.31484853	.08633705	.14932535	.15997275	.1905	.1280
8	1187.55938541	5.18292E-04	4.12057E-03	.07612900	.31437869	.08827413	.12365711	.15851704	.2381	.1258
9	1206.61867035	5.20376E-04	4.19028E-03	.07705788	.31370114	.08957086	.10478316	.15766289	.2857	.1243
10	1225.67795528	5.23533E-04	4.24728E-03	.07774493	.31326904	.09033504	.09088779	.15669028	.3333	.1232
11	1244.73724021	5.26011E-04	4.29609E-03	.07830339	.31274057	.09113567	.07988134	.15648611	.3810	.1224
12	1263.79652514	5.28654E-04	4.33847E-03	.07874415	.31238173	.09150762	.07115159	.15611068	.4286	.1219
13	1282.85581007	5.31372E-04	4.37697E-03	.07911219	.31202561	.09165217	.06390911	.15582153	.4762	.1214
14	1301.91509500	5.34150E-04	4.41248E-03	.07940635	.31174547	.09163696	.05788310	.15560408	.5238	.1211
15	1320.97437693	5.37031E-04	4.44591E-03	.07965242	.31151581	.09146777	.05271666	.15543703	.5714	.1208
16	1340.03366487	5.40163E-04	4.47834E-03	.07984066	.31138846	.09118191	.04825923	.15531722	.6190	.1206
17	1359.09294980	5.43323E-04	4.50960E-03	.07999417	.31126709	.09079369	.04431830	.15522375	.6667	.1205
18	1378.15223473	5.46795E-04	4.54133E-03	.08009178	.31121810	.09029618	.04090306	.15517955	.7143	.1204
19	1397.21151966	5.50344E-04	4.57250E-03	.08016385	.31126120	.08972001	.03780578	.15515124	.7619	.1204
20	1416.27080459	5.54390E-04	4.60561E-03	.08017195	.31143629	.08907270	.03501435	.15515851	.8095	.1204
21	1435.33008952	5.58473E-04	4.63830E-03	.08016337	.31161203	.0883[illegible]	.03246622	.15518033	.8571	.1204
22	1454.38937445	5.63304E-04	4.67469E-03	.08007230	.31163509	.0875[illegible]	.03013823	.15524229	.9048	.1205
23	1473.44865939	5.68130E-04	4.71051E-03	.07997611	.3122[illegible]000	.086[illegible]927	.02798183	.15531191	.9524	.1206
24	1492.50794432	5.74063E-04	4.75234E-03	.07976720	.31280688	.08582315	.02599473	.15543224	1.0000	.1208

K=20 PHI =170.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1092.26296076	4.97409E-04	2.27006E-03	.02957376	.30194016	.03901094	.91703047	.20934041	0.0000	.2191
4	1110.86585196	4.97184E-04	3.69297E-03	.07378434	.31701593	.03703787	.23535506	.16409145	.0476	.1346
5	1129.46874317	4.97894E-04	4.00737E-03	.07937067	.31755223	.04028871	.12234541	.15763541	.0952	.1242
6	1148.07163437	4.97569E-04	4.07236E-03	.08056582	.31688118	.04376072	.06997489	.15638440	.1429	.1223
7	1166.67452558	4.90413E-04	4.15970E-03	.08174126	.31629500	.04541452	.07824080	.15519494	.1905	.1204
8	1185.27741678	4.92672E-04	4.17027E-03	.08250257	.31570175	.04657619	.06912276	.15464662	.2381	.1196
9	1203.88030769	4.99021E-04	4.20179E-03	.08296477	.31518819	.04760045	.05827830	.15411931	.2857	.1188
10	1222.48319920	4.99305E-04	4.22177E-03	.08330199	.31471323	.04819837	.05220485	.15379776	.3333	.1183
11	1241.08609040	4.99528E-04	4.24118E-03	.08378288	.31429168	.04851749	.04635121	.15348908	.3810	.1178
12	1259.68898161	4.99844E-04	4.25547E-03	.08410042	.31390147	.04871582	.04215467	.15327041	.4286	.1175
13	1278.29187281	5.00068E-04	4.26901E-03	.08440636	.31354266	.04876291	.03815188	.15306115	.4762	.1171
14	1296.89476402	5.00274E-04	4.27619E-03	.08466650	.31320533	.04873109	.03500332	.15289323	.5238	.1169
15	1315.49765522	5.00421E-04	4.28994E-03	.08493427	.31288255	.04860673	.03202397	.15274222	.5714	.1167
16	1334.10054643	5.00577E-04	4.29851E-03	.08515410	.31257547	.04842689	.02953250	.15261300	.6190	.1165
17	1352.70343763	5.00648E-04	4.30518E-03	.08538309	.31225913	.04818219	.02718536	.15248820	.6667	.1163
18	1371.30632884	5.00742E-04	4.31304E-03	.08559464	.31197707	.04789456	.02513345	.15238085	.7143	.1161
19	1389.90922005	5.00722E-04	4.31866E-03	.08581019	.31167336	.04755471	.02321101	.15227513	.7619	.1159
20	1408.51211125	5.00765E-04	4.32445E-03	.08601018	.31130744	.04717777	.02147934	.15218204	.8095	.1158
21	1427.11500246	5.00648E-04	4.32880E-03	.08622238	.31107724	.04675138	.01984332	.15208889	.8571	.1157
22	1445.71789366	5.00661E-04	4.33353E-03	.08641523	.31079471	.04628954	.01834143	.15200788	.9048	.1155
23	1464.32078487	5.00453E-04	4.33667E-03	.08662876	.31047359	.04577440	.01691152	.15192123	.9524	.1154
24	1482.92367607	5.00485E-04	4.34100E-03	.08681379	.31019947	.04522186	.01557797	.15185031	1.0000	.1153

K=21 PHI =180.0 Z = **********

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
31092	.26296076	4.96248E-04	2.26627E-03	.83046139	.30226323	0.00000000	.91703047	.20927056	0.0000	.2190
41110	.44098347	4.95676E-04	3.96812E-03	.87956885	.31850305	0.00000000	.13165f70	.15905977	.0476	.1249
51128	.61900618	4.95831E-04	4.13408E-03	.88259927	.31793240	0.00000000	.07461170	.15487899	.0952	.1199
61146	.79702890	4.95202E-04	4.14608E-03	.88318207	.31709745	0.00000000	.06929435	.15455655	.1429	.1194
71164	.97505161	4.94814E-04	4.18228E-03	.88401281	.31650139	0.00000000	.05612998	.15391494	.1905	.1183
81183	.15307432	4.94304E-04	4.19191E-03	.88445002	.31595850	0.00000000	.05207673	.15358978	.2391	.1179
91201	.33109704	4.93802E-04	4.20596E-03	.88493841	.31553479	0.00000000	.04538162	.15318082	.2867	.1173
101219	.50911975	4.93498E-04	4.21568E-03	.88525447	.31513785	0.00000000	.04210463	.15297857	.3333	.1170
111237	.68714246	4.92729E-04	4.22538E-03	.88560163	.31476863	0.00000000	.03775129	.15271645	.3810	.1166
121255	.86516518	4.92160E-04	4.23014E-03	.88586950	.31446647	0.00000000	.03502188	.15254249	.4286	.1163
131274	.04318789	4.91523E-04	4.23584E-03	.88615299	.31415573	0.00000000	.03184093	.15234110	.4762	.1160
141292	.22121060	4.90355E-04	4.23874E-03	.88639815	.31384018	0.00000000	.02952777	.15218585	.5238	.1158
151310	.39923332	4.90093E-04	4.24157E-03	.88665535	.31352224	0.00000000	.02704285	.15201719	.5714	.1155
161328	.57725603	4.89288E-04	4.24255E-03	.88699528	.31319149	0.00000000	.02505719	.15187353	.6190	.1153
171346	.75527874	4.88343E-04	4.24287E-03	.88714930	.31283586	0.00000000	.02302937	.15172168	.6667	.1151
181364	.93330146	4.87327E-04	4.24178E-03	.88739830	.31246914	0.00000000	.02130507	.15158317	.7143	.1149
191383	.11132417	4.86113E-04	4.23940E-03	.88766753	.31205914	0.00000000	.01959650	.15143675	.7619	.1147
201401	.28934688	4.84807E-04	4.23585E-03	.88793966	.31162441	0.00000000	.01808095	.15129668	.8095	.1145
211419	.46736960	4.83201E-04	4.23029E-03	.88824322	.31112653	0.00000000	.01660278	.15114514	.8571	.1142
221437	.64539231	4.81482E-04	4.22361E-03	.88855539	.31059854	0.00000000	.01525083	.15099527	.9048	.1140
231455	.82341502	4.79279E-04	4.21374E-03	.88891931	.30996847	0.00000000	.01393956	.15082574	.9524	.1137
241474	.00143774	4.76948E-04	4.20278E-03	.88929594	.30930387	0.00000000	.01270887	.15065447	1.0000	.1135



VERTICAL SCALING

0.	< 0 <	.800E-03	.800E-03	< 1 <	.160E-02
.160E-02	< 2 <	.240E-02	.240E-02	< 3 <	.320E-02
.320E-02	< 4 <	.400E-02	.400E-02	< 5 <	.480E-02
.480E-02	< 6 <	.560E-02	.560E-02	< 7 <	.640E-02
.640E-02	< 8 <	.720E-02	.720E-02	< 9 <	.800E-02
.800E-02	< A <	.880E-02	.880E-02	< B <	.960E-02
.960E-02	< C <	.104E-01	.104E-01	< D <	.112E-01
.112E-01	< E <	.120E-01	.120E-01	< F <	.128E-01
.128E-01	< G <	.136E-01	.136E-01	< H <	.144E-01
.144E-01	< I <	.152E-01			

SURFACE FLOW VARIABLES AT Z =**********

X/L = .300097 DZDT=343.454220 ITER= 1500

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	M/MT	TEMP	(S-S.INF)/CV
0.0	1092.2630	.6709	2.4012E+01	5.0298E+00	2.3607	.8592	0.0000	2.9735E-01	1.0000	.4420M	.00	9.1703E-01
10.0	1092.2630	.6616	2.3694E+01	4.9823E+00	2.3675	.8617	.0841	2.9677E-01	1.0000	.44036	.00	9.1703E-01
20.0	1092.2630	.6346	2.2767E+01	4.8421E+00	2.3877	.8691	.1679	2.9508E-01	1.0000	.43536	.00	9.1703E-01
30.0	1092.2630	.5919	2.1305E+01	4.6175E+00	2.4218	.8815	.2506	2.9229E-01	1.0000	.42717	.00	9.1703E-01
40.0	1092.2630	.5368	1.9415E+01	4.3711E+00	2.4701	.8990	.3317	2.8849E-01	1.0000	.41598	.00	9.1703E-01
50.0	1092.2630	.4733	1.7254E+01	3.9688E+00	2.5352	.9220	.4106	2.8357E-01	1.0000	.40207	.00	9.1703E-01
60.0	1092.2630	.4056	1.4915E+01	3.5796E+00	2.6116	.9505	.4862	2.7777E-01	1.0000	.38579	.00	9.1703E-01
70.0	1092.2630	.3379	1.2590E+01	3.1714E+00	2.7059	.9848	.5579	2.7115E-01	1.0000	.36757	.00	9.1703E-01
80.0	1092.2630	.2736	1.0386E+01	2.7642E+00	2.8163	1.0250	.6242	2.6378E-01	1.0000	.34791	.00	9.1703E-01
90.0	1092.2630	.2155	8.3904E+00	2.3734E+00	2.9429	1.0711	.6835	2.5585E-01	1.0000	.32733	.00	9.1703E-01
100.0	1092.2630	.1649	6.6573E+00	2.0119E+00	3.0853	1.1230	.7339	2.4755E-01	1.0000	.30640	.00	9.1703E-01
110.0	1092.2630	.1232	5.2210E+00	1.6921E+00	3.2409	1.1796	.7734	2.3914E-01	1.0000	.28590	.00	9.1703E-01
120.0	1092.2630	.0899	4.1041E+00	1.4195E+00	3.4069	1.2398	.7986	2.3096E-01	1.0000	.26648	.00	9.1703E-01
130.0	1092.2630	.0647	3.2205E+00	1.1977E+00	3.5797	1.3011	.7808	2.2316E-01	1.0000	.24899	.00	9.1703E-01
140.0	1092.2630	.0471	2.6167E+00	1.0339E+00	3.7522	1.3584	.7310	2.1667E-01	1.0000	.23484	.00	9.1703E-01
150.0	1092.2630	.0367	2.2581E+00	9.2936E-01	3.8571	1.4039	.6141	2.1212E-01	1.0000	.22497	.00	9.1703E-01
160.0	1092.2630	.0321	2.0955E+00	8.8240E-01	3.9352	1.4316	.4149	2.0995E-01	1.0000	.22034	.00	9.1703E-01
170.0	1092.2630	.0309	2.0592E+00	8.7015E-01	3.9628	1.4423	.1864	2.0934E-01	1.0000	.21912	.00	9.1703E-01
180.0	1092.2630	.0307	2.0544E+00	8.6870E-01	3.9684	1.4444	0.0000	2.0927E-01	1.0000	.21897	.00	9.1703E-01

BODY AND SHOCK GEOMETRY AT Z =******

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	1092.2630	.3640	0.0000	1320.4665	.4400	0.0000
10.0	1092.2630	.3640	0.0000	1321.2484	.4402	8.9543
20.0	1092.2630	.3640	0.0000	1323.5921	.4410	18.1476
30.0	1092.2630	.3640	0.0000	1327.5812	.4423	27.7392
40.0	1092.2630	.3640	0.0000	1333.2749	.4442	37.9337
50.0	1092.2630	.3640	0.0000	1340.8225	.4467	48.7614
60.0	1092.2630	.3640	0.0000	1350.2958	.4499	60.3783
70.0	1092.2630	.3640	0.0000	1361.8905	.4538	72.9440
80.0	1092.2630	.3640	0.0000	1375.5836	.4584	86.7927
90.0	1092.2630	.3640	0.0000	1391.4967	.4637	96.5243
100.0	1092.2630	.3640	0.0000	1409.2071	.4696	105.5630
110.0	1092.2630	.3640	0.0000	1428.3452	.4760	111.8165
120.0	1092.2630	.3640	0.0000	1448.2384	.4827	111.4159
130.0	1092.2630	.3640	0.0000	1467.2367	.4890	100.0433
140.0	1092.2630	.3640	0.0000	1483.1601	.4943	72.5267
150.0	1092.2630	.3640	0.0000	1492.5535	.4974	26.7796
160.0	1092.2630	.3640	0.0000	1492.5079	.4974	-27.5867
170.0	1092.2630	.3640	0.0000	1482.9237	.4942	-53.0172
180.0	1092.2630	.3640	0.0000	1474.0014	.4912	0.0000

CONE SOLUTION RESET TO Z-INITIAL= 1.00000

K= 3 PHI = 0.0 Z = 1.000000

J	A	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	5.8003E-03	1.3121E-02	.70192138	.25547849	0.00000000	.91703047	.29733386	0.0000	.4420
4	.36759134	5.7988E-03	1.3119E-02	.70319446	.25203113	0.00000000	.91702521	.29732235	.0478	.4420
5	.37121245	5.7957E-03	1.3114E-02	.70445865	.24857450	0.00000000	.91702521	.29729939	.0952	.4419
6	.37483356	5.7906E-03	1.3105E-02	.70571906	.24513914	0.00000000	.91702521	.29726253	.1429	.4418
7	.37845467	5.7835E-03	1.3094E-02	.70703527	.24172402	0.00000000	.91702521	.29721057	.1905	.4417
8	.38207578	5.7745E-03	1.3080E-02	.70852715	.23832627	0.00000000	.91702521	.29714415	.2381	.4415
9	.38569689	5.7635E-03	1.3062E-02	.70962511	.23494511	0.00000000	.91702521	.29706329	.2857	.4412
10	.38931800	5.7504E-03	1.3041E-02	.71092973	.23157854	0.00000000	.91702521	.29696811	.3333	.4410
11	.39293911	5.7358E-03	1.3017E-02	.71229169	.22822460	0.00000000	.91702521	.29685865	.3810	.4408
12	.39655022	5.7191E-03	1.2990E-02	.71356174	.22488107	0.00000000	.91702521	.29673495	.4286	.4403
13	.40018133	5.7005E-03	1.2960E-02	.71489078	.22154555	0.00000000	.91702521	.29659695	.4762	.4398
14	.40380244	5.6800E-03	1.2926E-02	.71622978	.21821548	0.00000000	.91702521	.29644457	.5238	.4394
15	.40742355	5.6577E-03	1.2890E-02	.71757978	.21487820	0.00000000	.91702521	.29627768	.5714	.4389
16	.41104466	5.6334E-03	1.2851E-02	.71894191	.21156086	0.00000000	.91702521	.29609611	.6190	.4384

17	.41466577	5.60736E-03	1.28085E-02	.72031743	.20823047	0.00000000	.91702521	.29589960	.6667	.4378
18	.41828688	5.57933E-03	1.27628E-02	.72170767	.20483588	0.00000000	.91702521	.29568786	.7143	.4372
19	.42190799	5.54937E-03	1.27138E-02	.72311413	.20134763	0.00000000	.91702521	.29546049	.7619	.4365
20	.42552910	5.51745E-03	1.26615E-02	.72453829	.19818826	0.00000000	.91702521	.29521710	.8095	.4358
21	.42915021	5.48350E-03	1.26058E-02	.72598251	.19481110	0.00000000	.91702521	.29495698	.8571	.4350
22	.43277131	5.44758E-03	1.25469E-02	.72744857	.19141471	0.00000000	.91702521	.29468013	.9048	.4342
23	.43639242	5.40929E-03	1.24837E-02	.72894039	.18798432	0.00000000	.91702521	.29438336	.9524	.4333
24	.44001353	5.36965E-03	1.24183E-02	.73044069	.18454858	0.00000000	.91702521	.29407422	1.0000	.4324

K= 4 PHI = 10.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	5.72347E-03	1.29974E-02	.70258673	.25573066	.02496519	.91703047	.29676778	0.0000	.4404
4	.36760372	5.72251E-03	1.29824E-02	.70375068	.25274761	.02561434	.91739748	.29679961	.0476	.4405
5	.37123721	5.71994E-03	1.29723E-02	.70518404	.24883630	.02670375	.91833028	.29668749	.0952	.4401
6	.37487069	5.71555E-03	1.29570E-02	.70654258	.24550954	.02763921	.91939498	.29656659	.1429	.4398
7	.37850418	5.70918E-03	1.29419E-02	.70789169	.24214938	.02851151	.91511687	.29645915	.1905	.4394
8	.38213766	5.70093E-03	1.29826E-02	.70922864	.23867222	.02933339	.91483821	.29634702	.2381	.4391
9	.38577115	5.69073E-03	1.29704E-02	.71056359	.23547051	.03012033	.91419783	.29622484	.2857	.4387
10	.38940464	5.67869E-03	1.29545E-02	.71189672	.23213212	.03087793	.91379746	.29609289	.3333	.4384
11	.39303812	5.66479E-03	1.29354E-02	.71323180	.22864611	.03161204	.91342087	.29594950	.3810	.4379
12	.39667161	5.64905E-03	1.29130E-02	.71456968	.22555026	.03232579	.91306744	.29579462	.4286	.4375
13	.40030510	5.63155E-03	1.28874E-02	.71591252	.22226256	.03302196	.91273056	.29562752	.4762	.4370
14	.40393858	5.61219E-03	1.28588E-02	.71726150	.21894053	.03370262	.91240912	.29544800	.5238	.4364
15	.40757207	5.59060E-03	1.27757E-02	.71861823	.21570188	.03436944	.91210001	.29525560	.5714	.4359
16	.41120555	5.56705E-03	1.27917E-02	.71998407	.21247324	.03502369	.91180219	.29505005	.6190	.4353
17	.41483904	5.54297E-03	1.27534E-02	.72136056	.20914232	.03566647	.91151403	.29483091	.6667	.4348
18	.41847253	5.51621E-03	1.27119E-02	.72274922	.20585583	.03629869	.91123469	.29459781	.7143	.4339
19	.42210601	5.48752E-03	1.26672E-02	.72415169	.20256041	.03692109	.91096320	.29435028	.7619	.4332
20	.42573950	5.45702E-03	1.26192E-02	.72556969	.19925251	.03753436	.91069895	.29408782	.8095	.4324
21	.42937299	5.42450E-03	1.25677E-02	.72700516	.19592821	.03813893	.91044132	.29380982	.8571	.4316
22	.43300647	5.38999E-03	1.25128E-02	.72846001	.19258350	.03873566	.91018978	.29351564	.9048	.4308
23	.43663996	5.35339E-03	1.24543E-02	.72993698	.18923.14	.03932369	.90994433	.29320439	.9524	.4298
24	.44027344	5.31469E-03	1.23920E-02	.73143730	.18581369	.03990744	.90970316	.29287545	1.0000	.4289

K= 5 PHI = 20.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	5.49950E-03	1.28320E-02	.70457174	.25644314	.01953493	.91703047	.29508029	0.0000	.4354
4	.36764094	5.50014E-03	1.28126E-02	.70655773	.25333584	.02077114	.91266038	.29462999	.0476	.4340
5	.37131165	5.49919E-03	1.28997E-02	.70824600	.25014794	.02196784	.90949728	.29428510	.0952	.4330
6	.37498235	5.49663E-03	1.27855E-02	.70972094	.24695206	.02308199	.90750584	.29405827	.1429	.4323
7	.37865306	5.49225E-03	1.27725E-02	.71115628	.24366842	.02417599	.90574711	.29377819	.1905	.4317
8	.38232377	5.48617E-03	1.27559E-02	.71254752	.24044255	.02519063	.90424139	.29353348	.2381	.4311
9	.38599447	5.47826E-03	1.27354E-02	.71393094	.23723198	.02619969	.90284919	.29342752	.2857	.4305
10	.38966518	5.46837E-03	1.27113E-02	.71527548	.23403448	.02717253	.90157137	.29322047	.3333	.4299
11	.39333589	5.45747E-03	1.27134E-02	.71662172	.23085063	.02812992	.90036318	.29300769	.3810	.4293
12	.39700659	5.44453E-03	1.27023E-02	.71798033	.22767824	.02907805	.89922153	.29278859	.4286	.4286
13	.40067730	5.42989E-03	1.26876E-02	.71929565	.22451590	.02999234	.89812782	.29256208	.4762	.4280
14	.40434801	5.41355E-03	1.26700E-02	.72062920	.22136122	.03089663	.89707845	.29232681	.5238	.4273
15	.40801871	5.39550E-03	1.26491E-02	.72196394	.21821202	.03178419	.89606463	.29208205	.5714	.4266
16	.41168942	5.37591E-03	1.26252E-02	.72330131	.21506561	.03265740	.89503306	.29182729	.6190	.4258
17	.41536013	5.35453E-03	1.25978E-02	.72464354	.21191928	.03351853	.89412907	.29155182	.6667	.4250
18	.41903083	5.33142E-03	1.25671E-02	.72599242	.20877005	.03436001	.89330021	.29128511	.7143	.4242
19	.42270154	5.30657E-03	1.25334E-02	.72734989	.20561478	.03518114	.89229352	.29099552	.7619	.4234
20	.42637225	5.27994E-03	1.24963E-02	.72871803	.20244933	.03598739	.89140753	.29069542	.8095	.4225
21	.43004295	5.25151E-03	1.24559E-02	.73009841	.19927220	.03678299	.89059001	.29038128	.8571	.4216
22	.43371366	5.22114E-03	1.24120E-02	.73149302	.19607538	.03756534	.88969003	.29005278	.9048	.4207
23	.43738437	5.18906E-03	1.23640E-02	.73290411	.19286345	.03834183	.88885556	.28971112	.9524	.4197
24	.44105507	5.15432E-03	1.23128E-02	.73434831	.18960342	.03854746	.88803787	.28934872	1.0000	.4186

K= 6 PHI = 30.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT

3	.36397023	5.14579E-03	1.20462E-02	.70787184	.25764428	.07325329	.91703047	.29229124	0.0000	.4272
4	.36770424	5.14885E-03	1.21593E-02	.71122024	.25514469	.07494908	.90454325	.29101527	.0476	.4234
5	.37143824	5.15038E-03	1.22188E-02	.71330006	.25223378	.07689299	.89800991	.29034939	.0952	.4215
6	.37517225	5.15063E-03	1.22554E-02	.71494971	.24919824	.07847573	.89365508	.28992096	.1429	.4203
7	.37890625	5.14928E-03	1.22955E-02	.71651588	.24618977	.08088722	.89017263	.28952868	.1905	.4191
8	.38264026	5.14647E-03	1.23085E-02	.71796704	.24314094	.08516994	.88700697	.28917924	.2381	.4181
9	.38637426	5.14217E-03	1.23270E-02	.71941588	.24012767	.08735757	.88407255	.28884188	.2857	.4171
10	.39010827	5.13640E-03	1.23409E-02	.72080163	.23712722	.08946764	.88137358	.28851732	.3333	.4162
11	.39384227	5.12917E-03	1.23510E-02	.72216170	.23414262	.09151361	.87881781	.28819610	.3810	.4153
12	.39757628	5.12049E-03	1.23574E-02	.72349780	.23117164	.09350467	.87639911	.28787757	.4286	.4144
13	.40131028	5.11056E-03	1.23609E-02	.72481771	.22821383	.09544799	.87407944	.28755779	.4762	.4134
14	.40504429	5.09877E-03	1.23600E-02	.72612369	.22526892	.09734909	.87185128	.28723592	.5238	.4125
15	.40877829	5.08573E-03	1.23564E-02	.72742007	.22233916	.09921237	.86969646	.28690998	.5714	.4116
16	.41251230	5.07123E-03	1.23496E-02	.72870917	.21939604	.10104144	.86760939	.28657916	.6190	.4106
17	.41624630	5.05535E-03	1.23397E-02	.72999337	.21647112	.10283926	.86557735	.28624226	.6667	.4097
18	.41996031	5.03777E-03	1.23261E-02	.73127675	.21354559	.10460832	.86359816	.28589849	.7143	.4087
19	.42371431	5.01877E-03	1.23104E-02	.73255984	.21061063	.10635070	.86166505	.28554699	.7619	.4077
20	.42744832	4.99820E-03	1.22909E-02	.73384588	.20768553	.10806929	.85977422	.28518687	.8095	.4067
21	.43118232	4.97608E-03	1.22683E-02	.73513607	.20474748	.10976643	.85792171	.28481771	.8571	.4056
22	.43491632	4.95219E-03	1.22420E-02	.73643665	.20179230	.11143510	.85610540	.28443739	.9048	.4045
23	.43865033	4.92695E-03	1.22131E-02	.73773792	.19883409	.11308576	.85432081	.28404907	.9524	.4034
24	.44238433	4.89886E-03	1.21784E-02	.73907957	.19581589	.11472006	.85257119	.28363950	1.0000	.4023

K= 7 PHI = 40.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	4.68926E-03	1.12728E-02	.71247322	.25931904	.09867938	.91703047	.28843751	0.0000	.4160
4	.36779459	4.69521E-03	1.14768E-02	.71762483	.25763501	.09764794	.89118335	.28604324	.0476	.4091
5	.37161894	4.69978E-03	1.15761E-02	.72020421	.25502949	.10121768	.88209397	.28495217	.0952	.4060
6	.37544329	4.70339E-03	1.16417E-02	.72208638	.25234519	.10441163	.87495157	.28425741	.1429	.4040
7	.37926764	4.70578E-03	1.16987E-02	.72382197	.24956598	.10740167	.86862594	.28363656	.1905	.4022
8	.38309200	4.70699E-03	1.17464E-02	.72539878	.24683578	.11024540	.86318443	.28309629	.2381	.4007
9	.38691635	4.70703E-03	1.17889E-02	.72689643	.24404110	.11297380	.85814285	.28258735	.2857	.3993
10	.39074070	4.70559E-03	1.18256E-02	.72831948	.24135859	.11561091	.85350750	.28211022	.3333	.3979
11	.39456505	4.70361E-03	1.18582E-02	.72969473	.23864470	.11815962	.84911904	.28164881	.3810	.3966
12	.39838941	4.70018E-03	1.18879E-02	.73102412	.23596705	.12066239	.84496887	.28120217	.4286	.3954
13	.40221376	4.69555E-03	1.19134E-02	.73232043	.23328561	.12309653	.84068972	.28078350	.4762	.3941
14	.40603811	4.68979E-03	1.19355E-02	.73358645	.23060119	.12547833	.83717021	.28033157	.5238	.3929
15	.40986246	4.68286E-03	1.19543E-02	.73482897	.22794972	.12781358	.83347775	.27960301	.5714	.3917
16	.41368682	4.67476E-03	1.19701E-02	.73605099	.22533987	.13010994	.82990193	.27947664	.6190	.3905
17	.41751117	4.66547E-03	1.19828E-02	.73725848	.22267864	.13236579	.82642519	.27905053	.6667	.3893
18	.42133552	4.65497E-03	1.19925E-02	.73844849	.22007638	.13458631	.82303908	.27862360	.7143	.3882
19	.42515987	4.64325E-03	1.19994E-02	.73962999	.21743779	.13677398	.81973319	.27819460	.7619	.3870
20	.42898423	4.63027E-03	1.20034E-02	.74080421	.21482000	.13893119	.81650116	.27778235	.8095	.3858
21	.43280858	4.61600E-03	1.20047E-02	.74197194	.21223275	.14105953	.81333592	.27732647	.8571	.3845
22	.43663293	4.60024E-03	1.20009E-02	.74314177	.20957411	.14316156	.81023373	.27688401	.9048	.3833
23	.44045728	4.58359E-03	1.19960E-02	.74429829	.20695497	.14523675	.80718718	.27643971	.9524	.3821
24	.44428164	4.56408E-03	1.19850E-02	.74549456	.20427319	.14729114	.80419983	.27597668	1.0000	.3809

K= 8 PHI = 50.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	4.16288E-03	1.03537E-02	.71834342	.26145562	.11642986	.91703047	.28357285	0.0000	.4021
4	.36791435	4.17184E-03	1.06559E-02	.72559262	.26074174	.11841567	.87890580	.27982381	.0476	.3915
5	.37185847	4.17961E-03	1.08009E-02	.72879187	.25866231	.12012549	.86192548	.27820593	.0952	.3870
6	.37580259	4.18679E-03	1.08994E-02	.73095608	.25627434	.12194139	.85097363	.27718783	.1429	.3842
7	.37974670	4.19311E-03	1.09855E-02	.73288921	.25386973	.12394189	.84133544	.27629486	.1905	.3817
8	.38369082	4.19859E-03	1.10511E-02	.73458503	.25144198	.13259529	.83301825	.27552867	.2381	.3796
9	.38763494	4.20322E-03	1.11303E-02	.73616304	.24902810	.13572320	.82537804	.27481928	.2857	.3776
10	.39157905	4.20703E-03	1.11939E-02	.73762597	.24662596	.13875331	.81853786	.27416458	.3333	.3758
11	.39552317	4.21001E-03	1.12529E-02	.73901329	.24424502	.14169646	.81187828	.27354190	.3810	.3741
12	.39946729	4.21216E-03	1.13078E-02	.74032941	.24188354	.14456690	.80540402	.27294878	.4286	.3725
13	.40341140	4.21348E-03	1.13588E-02	.74159174	.23954375	.14737145	.79919344	.27237553	.4762	.3709
14	.40735552	4.21398E-03	1.14067E-02	.74280465	.23722384	.15011844	.79362933	.27182000	.5238	.3694
15	.41129964	4.21365E-03	1.14515E-02	.74397733	.23492343	.15281265	.78806644	.27127735	.5714	.3680

16	.41524376	4.21248E-03	1.14933E-02	.74511370	.23264052	.15545941	.78268447	.27074576	.6190	.3645
17	.41918787	4.21048E-03	1.15323E-02	.74621936	.23037360	.15806226	.77745985	.27022250	.6667	.3651
18	.42313199	4.20756E-03	1.15686E-02	.74729790	.22812024	.16062486	.77237819	.26970601	.7143	.3657
19	.42707611	4.20375E-03	1.16021E-02	.74835295	.22587878	.16314986	.76742527	.26919464	.7619	.3623
20	.43102022	4.19906E-03	1.16330E-02	.74938564	.22364514	.16564009	.76258525	.26868636	.8095	.3610
21	.43496434	4.19348E-03	1.16612E-02	.75040833	.22142083	.16809725	.75785504	.26818202	.8571	.3596
22	.43890846	4.18668E-03	1.16863E-02	.75141367	.21919160	.17052434	.75322043	.26767666	.9048	.3583
23	.44285257	4.17941E-03	1.17098E-02	.75239558	.21698340	.17292100	.74867694	.26717632	.9524	.3569
24	.44679669	4.16965E-03	1.17276E-02	.75340677	.21478024	.17529297	.74422418	.26666302	1.0000	.3555

K= 9 PHI = 60.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	3.60231E-03	9.33745E-03	.72593162	.26403552	.15506581	.91703047	.27777381	0.0000	.3858
4	.36806467	3.61397E-03	9.37815E-03	.73502273	.26442731	.15678531	.86143839	.27243900	.0476	.3711
5	.37215911	3.62474E-03	9.42777E-03	.73599622	.26287910	.15807643	.83741424	.27022622	.0952	.3651
6	.37625355	3.63524E-03	1.00581E-02	.74135941	.26109954	.16455463	.82204387	.26885799	.1429	.3614
7	.38034799	3.64[illegible]E-03	1.01769E-02	.74356528	.25886944	.16813081	.80947009	.26765359	.1905	.3582
8	.38444243	3.65470E-03	1.02769E-02	.74552452	.25650037	.17166180	.79684524	.26665233	.2381	.3555
9	.38853687	3.66358E-03	1.03772E-02	.74698291	.25481914	.17515771	.78611134	.26572542	.2857	.3530
10	.39263131	3.67216E-03	1.04577E-02	.74848174	.25270877	.17829799	.77627434	.26488097	.3333	.3508
11	.39672575	3.68015E-03	1.05536E-02	.74997513	.25090203	.18147763	.76700280	.26409734	.3810	.3487
12	.40082019	3.68765E-03	1.06351E-02	.75116868	.24882773	.18458337	.75826496	.26334111	.4286	.3467
13	.40491462	3.69467E-03	1.07137E-02	.75238567	.24637975	.18781948	.74998214	.26262548	.4762	.3449
14	.40900906	3.70121E-03	1.07851E-02	.75353194	.24495469	.19059501	.74194305	.26194778	.5238	.3431
15	.41310350	3.70720E-03	1.08601E-02	.75461849	.24305997	.19351598	.73425960	.26129093	.5714	.3414
16	.41719794	3.71281E-03	1.09215E-02	.75555333	.24116500	.19639195	.72684592	.26065501	.6190	.3397
17	.42129238	3.71787E-03	1.09924E-02	.75669365	.23933187	.19920928	.71984947	.26003878	.6667	.3381
18	.42538682	3.72247E-03	1.10600E-02	.75758595	.23750542	.20197881	.71285522	.25943761	.7143	.3368
19	.42948126	3.72669E-03	1.11235E-02	.75849351	.23569278	.20471418	.70591521	.25885023	.7619	.3350
20	.43357570	3.72992E-03	1.11853E-02	.75936845	.23389760	.20741141	.69930955	.25827444	.8095	.3335
21	.43767014	3.73269E-03	1.12412E-02	.76021094	.23212105	.21007228	.69286294	.25770979	.8571	.3321
22	.44176458	3.73505E-03	1.12966E-02	.76103276	.23034798	.21269986	.68656419	.25715198	.9048	.3306
23	.44585902	3.73707E-03	1.13508E-02	.76181745	.22860473	.21529442	.68040104	.25660837	.9524	.3292
24	.44995345	3.73735E-03	1.14004E-02	.76261167	.22692435	.21786026	.67437027	.25605682	1.0000	.3278

K=10 PHI = 70.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	3.04114E-03	8.27365E-03	.73365014	.26702681	.15127516	.91703047	.27113464	0.0000	.3676
4	.36824878	3.05492E-03	8.76161E-03	.74563875	.26858700	.15235607	.84133510	.26907253	.0476	.3487
5	.37252733	3.06815E-03	8.99197E-03	.75021874	.26761545	.15602948	.80931112	.26123158	.0952	.3412
6	.37680588	3.08135E-03	9.15557E-03	.75300571	.26610171	.15993899	.78865048	.25947016	.1429	.3366
7	.38108443	3.09435E-03	9.30101E-03	.75570644	.26454384	.16346218	.77050046	.25794883	.1905	.3327
8	.38536298	3.10715E-03	9.43233E-03	.75737603	.26292420	.16701401	.75506879	.25667693	.2381	.3294
9	.38964153	3.11977E-03	9.55635E-03	.75907035	.26131774	.17044568	.74077708	.25552353	.2857	.3265
10	.39392008	3.13220E-03	9.67274E-03	.76060779	.25971511	.17379997	.72780219	.25448671	.3333	.3238
11	.39819863	3.14446E-03	9.78452E-03	.76199955	.25813603	.17706498	.71561727	.25352509	.3810	.3214
12	.40247718	3.15655E-03	9.89194E-03	.76325876	.25658507	.18026033	.70418737	.25262873	.4286	.3191
13	.40675572	3.16848E-03	9.99533E-03	.76441778	.25506273	.18338439	.69331219	.25178507	.4762	.3170
14	.41103427	3.18025E-03	1.00968E-02	.76548388	.25355989	.18644763	.68295362	.25098626	.5238	.3150
15	.41531282	3.19187E-03	1.01957E-02	.76647018	.25210633	.18945133	.67301278	.25022911	.5714	.3131
16	.41959137	3.20334E-03	1.02916E-02	.76738558	.25067676	.19240174	.66346663	.24950435	.6190	.3113
17	.42386992	3.21466E-03	1.03855E-02	.76823928	.24927515	.19530108	.65426067	.24880890	.6667	.3095
18	.42814847	3.22583E-03	1.04779E-02	.76903553	.24790160	.19815546	.64538858	.24814005	.7143	.3079
19	.43242702	3.23686E-03	1.05688E-02	.76977787	.24655602	.20096113	.63685743	.24749490	.7619	.3063
20	.43670557	3.24776E-03	1.06574E-02	.77047347	.24523431	.20372719	.62825705	.24687081	.8095	.3047
21	.44098412	3.25827E-03	1.07450E-02	.77112480	.24393697	.20645341	.62068545	.24628682	.8571	.3032
.2	.44526267	3.26853E-03	1.08306E-02	.77174155	.24266029	.20914287	.61212802	.24567875	.9048	.3018
23	.44954121	3.27897E-03	1.09156E-02	.77231249	.24141465	.21179696	.60436789	.24510998	.9524	.3004
24	.45381976	3.28850E-03	1.09975E-02	.77286934	.24015927	.21441681	.59679618	.24454936	1.0000	.2990

K=11 PHI = 80.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT

3	.36397023	2.50879E-03	7.21112E-03	.74288185	.27038688	.16465480	.91703047	.26378260	0.0000	.3479
4	.36846594	2.52388E-03	7.77044E-03	.75726394	.27315199	.16972546	.81844036	.25487441	.0476	.3248
5	.37296164	2.53875E-03	8.03922E-03	.76265051	.27282169	.16779116	.77670851	.25131471	.0952	.3158
6	.37745734	2.55375E-03	8.22858E-03	.76578113	.27180558	.17131784	.75000601	.24913899	.1429	.3104
7	.38195304	2.56804E-03	8.40087E-03	.76826608	.27070421	.17478550	.72688765	.24729854	.1905	.3058
8	.38644874	2.58397E-03	8.55528E-03	.77042411	.26952344	.17824219	.70726847	.24577776	.2381	.3020
9	.39094445	2.59919E-03	8.70177E-03	.77221594	.26834522	.18159541	.68936817	.24441649	.2857	.2987
10	.39544015	2.61443E-03	8.84031E-03	.77375078	.26713080	.18488722	.67312033	.24320629	.3333	.2957
11	.39993585	2.62985E-03	8.97427E-03	.77511643	.26602309	.18809255	.65793650	.24209396	.3810	.2930
12	.40443155	2.64535E-03	9.10379E-03	.77632170	.26490283	.19127213	.64375408	.24107317	.4286	.2906
13	.40892725	2.66102E-03	9.23034E-03	.77740436	.26381799	.19426380	.63031695	.24012101	.4762	.2883
14	.41342296	2.67678E-03	9.35412E-03	.77837244	.26276798	.19730383	.61757316	.23925233	.5238	.2862
15	.41791866	2.69268E-03	9.47564E-03	.77924518	.26175550	.20029611	.60539479	.23839568	.5714	.2842
16	.42241436	2.70872E-03	9.59570E-03	.78002935	.26077963	.20315248	.59373938	.23760699	.6190	.2823
17	.42691006	2.72493E-03	9.71400E-03	.78073594	.25984090	.20596373	.58253601	.23685939	.6667	.2805
18	.43140576	2.74123E-03	9.83114E-03	.78137054	.25893785	.20874437	.57175234	.23615125	.7143	.2788
19	.43590147	2.75781E-03	9.94711E-03	.78193988	.25807043	.21147619	.56139458	.23547719	.7619	.2772
20	.44039717	2.77448E-03	1.00623E-02	.78249917	.25723616	.21416227	.55125716	.23485500	.8095	.2757
21	.44489287	2.79134E-03	1.01762E-02	.78290206	.25643577	.21680788	.54155107	.23422242	.8571	.2743
22	.44938857	2.80831E-03	1.02895E-02	.78330470	.25566465	.21940586	.53211594	.23363668	.9048	.2729
23	.45388428	2.82548E-03	1.04021E-02	.78365726	.25492563	.22196839	.52296165	.23307692	.9524	.2716
24	.45837998	2.84272E-03	1.05140E-02	.78396799	.25421175	.22449116	.51407088	.23254002	1.0000	.2704

K=12 PHI = 90.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	2.02675E-03	6.19174E-03	.75297869	.27404220	.17487440	.91703047	.25586342	0.0000	.3273
4	.36871844	2.04223E-03	6.80613E-03	.76974315	.27804850	.17357108	.79219157	.24997249	.0476	.3001
5	.37346666	2.05784E-03	7.10209E-03	.77582750	.27852440	.17571342	.74021673	.24072890	.0952	.2898
6	.37821487	2.07365E-03	7.31016E-03	.77920532	.27737419	.17892521	.70744215	.23818777	.1429	.2837
7	.38296308	2.08976E-03	7.50102E-03	.78196274	.27712251	.18205862	.67906919	.23604747	.1905	.2786
8	.38771129	2.10612E-03	7.67311E-03	.78411085	.27637814	.18515350	.65506598	.23429317	.2381	.2745
9	.39245950	2.12277E-03	7.83502E-03	.78595167	.27563549	.18835912	.63522877	.23273461	.2857	.2708
10	.39720771	2.13986E-03	7.99488E-03	.78749454	.27480032	.19142889	.61349769	.23136268	.3333	.2676
11	.40195592	2.15699E-03	8.14662E-03	.78883850	.27412529	.19441447	.59514710	.23011508	.3810	.2648
12	.40670413	2.17451E-03	8.29431E-03	.78999360	.27348972	.19734502	.57810318	.22898427	.4286	.2622
13	.41145234	2.19244E-03	8.43924E-03	.79100299	.27284045	.20020421	.56206585	.22794325	.4762	.2598
14	.41620055	2.21072E-03	8.58155E-03	.79187611	.27223009	.20300371	.54695628	.22698588	.5238	.2576
15	.42094876	2.22940E-03	8.72217E-03	.79263473	.27166206	.20573898	.53261900	.22609794	.5714	.2556
16	.42569697	2.24848E-03	8.86113E-03	.79328769	.27113445	.20841666	.51900007	.22527461	.6190	.2537
17	.43044518	2.26790E-03	8.99887E-03	.79384671	.27064811	.21103554	.50601784	.22450861	.6667	.2520
18	.43519339	2.28777E-03	9.13562E-03	.79431875	.27020267	.21360259	.49362279	.22378553	.7143	.2504
19	.43994161	2.30800E-03	9.27167E-03	.79471182	.26978824	.21611565	.48175741	.22313048	.7619	.2489
20	.44468982	2.32877E-03	9.40716E-03	.79503.00	.26943354	.21857876	.47038295	.22250978	.8095	.2476
21	.44943803	2.34995E-03	9.54234E-03	.79528430	.26910906	.22099349	.45945991	.22193020	.8571	.2463
22	.45418624	2.37154E-03	9.67725E-03	.79547458	.26882198	.22336215	.44895702	.22138848	.9048	.2451
23	.45893445	2.39363E-03	9.81215E-03	.79560512	.26857431	.22568663	.43884561	.22088272	.9524	.2439
24	.46368266	2.41611E-03	9.94687E-03	.79568298	.26836008	.22796884	.42910052	.22040947	1.0000	.2429

K=13 PHI =100.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	1.60821E-03	5.24877E-03	.76375443	.27798389	.18167908	.91703047	.24754670	0.0000	.3064
4	.36899947	1.62323E-03	5.89445E-03	.78264227	.28311000	.17870983	.76390365	.23468387	.0476	.2754
5	.37402871	1.63863E-03	6.21076E-03	.78944506	.28199184	.17988727	.76016743	.22971183	.0952	.2638
6	.37905794	1.65419E-03	6.43527E-03	.793.6159	.28193442	.18227738	.65990329	.22673813	.1429	.2571
7	.38408718	1.67028E-03	6.64210E-03	.79814506	.28373330	.18488454	.62526417	.22426153	.1905	.2515
8	.38911642	1.68666E-03	6.82870E-03	.79941391	.28341180	.18766342	.59626295	.22225905	.2381	.2470
9	.39414565	1.70351E-03	7.00582E-03	.80031227	.28307079	.19059220	.57015667	.22050942	.2857	.2431
10	.39917489	1.72076E-03	7.17591E-03	.80185636	.28271854	.19312267	.54686120	.21899782	.3333	.2398
11	.40420413	1.73855E-03	7.34604E-03	.80316219	.28238623	.19578822	.52596134	.21764923	.3810	.2369
12	.40923337	1.75676E-03	7.49924E-03	.80424483	.28207765	.19840511	.50584879	.21645224	.4286	.2343
13	.41426260	1.77549E-03	7.65535E-03	.80515599	.28180531	.20095338	.48760898	.21537286	.4762	.2319
14	.41929184	1.79474E-03	7.80860E-03	.80590783	.28157157	.20344208	.47084559	.21440212	.5238	.2298

15	.42432108	1.81453E-03	7.95994E-03	.80652821	.28138116	.20586161	.45473909	.21352184	.5714	.2280
16	.42935031	1.83490E-03	8.10969E-03	.80702508	.28125695	.20821763	.43980818	.21272522	.6190	.2263
17	.43437955	1.85587E-03	8.25854E-03	.80741868	.28114230	.21050725	.42570672	.21200040	.6667	.2247
18	.43940879	1.87743E-03	8.40666E-03	.80771403	.28109638	.21273480	.41237336	.21134180	.7143	.2233
19	.44443802	1.89962E-03	8.55445E-03	.80792200	.28110116	.21490071	.39972210	.21074243	.7619	.2221
20	.44946726	1.92243E-03	8.70210E-03	.80804915	.28115544	.21700786	.38770258	.21019750	.8095	.2209
21	.45449650	1.94589E-03	8.84989E-03	.80810186	.28125973	.21905862	.37625548	.20970340	.8571	.2199
22	.45952573	1.97002E-03	8.99802E-03	.80808534	.28141336	.22105942	.36534082	.20925561	.9048	.2189
23	.46455497	1.99479E-03	9.14656E-03	.80800511	.28161380	.22300045	.35491366	.20885029	.9524	.2181
24	.46958421	2.02033E-03	9.29599E-03	.80786240	.28186631	.22489267	.34494439	.20848646	1.0000	.2173

K=14 PHI =110.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	1.26213E-03	4.41455E-03	.77498133	.28207014	.18422596	.91703047	.23912389	0.0000	.2859
4	.36930315	1.27575E-03	5.08100E-03	.79609455	.28639078	.17930298	.73090084	.22405839	.0476	.2511
5	.37463607	1.29011E-03	5.41311E-03	.80356942	.28973450	.17890516	.65347836	.21832594	.0952	.2383
6	.37996899	1.30450E-03	5.64778E-03	.80756694	.29003833	.18080873	.60522746	.21493841	.1429	.2310
7	.38530191	1.31971E-03	5.86312E-03	.81070189	.29029163	.18285371	.56435973	.21217293	.1905	.2251
8	.39063482	1.33515E-03	6.05590E-03	.81300947	.29029374	.18519626	.53072487	.20993082	.2381	.2205
9	.39596774	1.35121E-03	6.23[illegible]E-03	.81488749	.29020769	.18751631	.50095859	.20812280	.2857	.2166
10	.40130066	1.36775E-03	6.41195E-03	.81635504	.29015365	.19002288	.47482503	.20654754	.3333	.2133
11	.40683358	1.38481E-03	6.57631E-03	.81757833	.29011736	.19213970	.45116491	.20517307	.3810	.2105
12	.41196650	1.40240E-03	6.74125E-03	.81854597	.29010507	.19436793	.42978320	.20396084	.4286	.2080
13	.41729941	1.42070E-03	6.89985E-03	.81932306	.29014051	.19651326	.41015008	.20292982	.4762	.2059
14	.42263233	1.43955E-03	7.05542E-03	.81994022	.29021946	.19858701	.39211376	.20200588	.5238	.2040
15	.42796525	1.45903E-03	7.20911E-03	.82041326	.29035110	.20057732	.37553073	.20118909	.5714	.2024
16	.43329817	1.47917E-03	7.36124E-03	.82075831	.29053942	.20249137	.35986394	.20048068	.6190	.2009
17	.43863109	1.49997E-03	7.51244E-03	.82099379	.29078245	.20432710	.34510485	.19983253	.6667	.1997
18	.44396400	1.52149E-03	7.66312E-03	.82112647	.29108724	.20608833	.33120541	.19927224	.7143	.1985
19	.44929692	1.54367E-03	7.81347E-03	.82117065	.29144744	.20777862	.31807562	.19877037	.7619	.1976
20	.45462984	1.56667E-03	7.96429E-03	.82112678	.29187413	.20939770	.30570728	.19834966	.8095	.1967
21	.45996276	1.59025E-03	8.11484E-03	.82101503	.29234726	.21095547	.29402286	.19797397	.8571	.1960
22	.46529569	1.61480E-03	8.26709E-03	.82081553	.29290041	.21244351	.28317010	.19765575	.9048	.1953
23	.47062859	1.63981E-03	8.41843E-03	.82057203	.29347455	.21388362	.27508696	.19737677	.9524	.1948
24	.47596151	1.66635E-03	8.57379E-03	.82023183	.29416940	.21524991	.26594902	.19715676	1.0000	.1944

K=15 PHI =120.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	9.86712E-04	3.70272E-03	.78641166	.28623044	.18205979	.91703047	.23086060	0.0000	.2665
4	.36961182	9.98852E-04	4.38197E-03	.80954542	.29348072	.17509901	.69293872	.21347077	.0476	.2278
5	.37526740	1.01135E-03	4.72442E-03	.81772102	.29535309	.17329600	.60054245	.20591447	.0952	.2141
6	.38091598	1.02799E-03	4.96340E-03	.82195199	.29601298	.17453495	.54388422	.20312990	.1429	.2063
7	.38656458	1.03735E-03	5.17908E-03	.82515744	.29633370	.17606028	.49707783	.20013268	.1905	.2003
8	.39221314	1.05105E-03	5.37106E-03	.82744496	.29659700	.17798174	.45945619	.19783203	.2381	.1957
9	.39788172	1.06535E-03	8.55130E-03	.82925867	.29679705	.17987465	.42675930	.19591310	.2857	.1919
10	.40351030	1.08015E-03	5.72008E-03	.83064861	.29687658	.18180079	.39863401	.19433767	.3333	.1888
11	.40915889	1.09557E-03	5.88249E-03	.83175596	.29702633	.18363085	.37357540	.19299550	.3810	.1862
12	.41480747	1.11151E-03	6.03879E-03	.83260593	.29720946	.18550866	.35133371	.19186518	.4286	.1841
13	.42045605	1.12800E-03	6.19135E-03	.83326612	.29744248	.18730873	.33121579	.19089503	.4762	.1822
14	.42610463	1.14533E-03	6.34003E-03	.83375973	.29773242	.18863051	.31303285	.19007034	.5238	.1806
15	.43175321	1.16317E-03	6.48788E-03	.83408525	.29803429	.19009955	.29641457	.18935371	.5714	.1793
16	.43740179	1.18173E-03	6.63294E-03	.83430926	.29850488	.19147698	.28121587	.18876500	.6190	.1782
17	.44305038	1.20093E-03	6.77717E-03	.83441315	.29895948	.19276227	.26721703	.18825658	.6667	.1772
18	.44869896	1.22093E-03	6.92111E-03	.83441115	.29955164	.19395996	.25430643	.18783311	.7143	.1764
19	.45434754	1.24152E-03	7.06439E-03	.83432560	.30017084	.19507836	.24234103	.18747944	.7619	.1757
20	.45999612	1.26307E-03	7.20874E-03	.83414412	.30088023	.19611415	.23123685	.18719718	.8095	.1752
.1	.46564470	1.28509E-03	7.35221E-03	.83390404	.30162639	.19708555	.22089089	.18698677	.8571	.1748
22	.47129328	1.30834E-03	7.49867E-03	.83358421	.30248927	.19797660	.21124509	.18680269	.9048	.1745
23	.47694186	1.33160E-03	7.64279E-03	.83320947	.30334452	.19882141	.20221280	.18667036	.9524	.1742
24	.48259045	1.35694E-03	7.79327E-03	.83271084	.30437340	.19958239	.19376851	.18660994	1.0000	.1741

K=16 PHI =130.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	7.78018E-04	3.12468E-03	.79771585	.29034483	.17423638	.91703047	.22315510	0.0000	.2490
4	.36992028	7.87680E-04	3.81722E-03	.82291010	.29852495	.16538198	.84910638	.20314968	.0476	.2063
5	.37587032	7.98158E-04	4.16813E-03	.83171042	.30071844	.16228242	.83919837	.19569906	.0952	.1915
6	.38182037	8.08452E-04	4.40623E-03	.83607514	.30152408	.16305566	.87420378	.19155910	.1429	.1835
7	.38777041	8.19495E-04	4.61693E-03	.83925974	.30195427	.16422042	.82241595	.18841357	.1905	.1775
8	.39372045	8.30306E-04	4.79950E-03	.84147563	.30219965	.16579359	.58182094	.18606535	.2381	.1731
9	.39967050	8.42702E-04	4.98077E-03	.84319409	.30237081	.16730994	.34751949	.18417371	.2857	.1696
10	.40562054	8.55044E-04	5.12498E-03	.84447418	.30252978	.16882182	.31872088	.18266816	.3333	.1668
11	.41157059	8.67547E-04	5.27364E-03	.84546820	.30271125	.17019815	.29306735	.18142878	.3810	.1646
12	.41752063	8.81353E-04	5.41620E-03	.84620579	.30293961	.17147700	.27192369	.18042117	.4286	.1628
13	.42347067	8.95[illegible]E-04	5.55249E-03	.84675429	.30322787	.17261615	.25267269	.17958859	.4762	.1613
14	.42942072	9.09[illegible]E-04	5.68573E-03	.84713332	.30353943	.17364055	.23562462	.17891159	.5238	.1600
15	.43537076	9.25178E-04	5.81650E-03	.84737871	.30402404	.17455942	.22033051	.17835011	.5714	.1591
16	.44132080	9.41645E-04	5.94571E-03	.84748558	.30454645	.17532798	.20660018	.17791738	.6190	.1583
17	.44727085	9.57471E-04	6.07358E-03	.84750143	.30514117	.17601043	.19416143	.17755718	.6667	.1577
18	.45322089	9.74710E-04	6.20106E-03	.84740486	.30583605	.17659242	.18287873	.17730450	.7143	.1572
19	.45917094	9.92419E-04	6.32773E-03	.84723431	.30653989	.17708803	.17257418	.17710816	.7619	.1568
20	.46512098	1.01116E-03	6.45515E-03	.84696143	.30746227	.17749278	.16315374	.17698585	.8095	.1566
21	.47107102	1.03014E-03	6.58313E-03	.84664370	.30836347	.17783110	.15448705	.17690818	.8571	.1565
22	.47702107	1.05056E-03	6.71413E-03	.84621341	.30941756	.17805488	.14651840	.17690078	.9048	.1565
23	.48297111	1.07075E-03	6.84207E-03	.84577841	.31044432	.17829310	.13913336	.17691511	.9524	.1565
24	.48892116	1.09310E-03	6.97766E-03	.84519846	.31168801	.17841824	.13232031	.17700682	1.0000	.1567

E-17 PHI =140.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	6.32089E-04	2.69382E-03	.80850917	.29427291	.15834842	.91703047	.21663045	0.0000	.2346
4	.37017295	6.39168E-04	3.41997E-03	.83603943	.30347387	.14821347	.59402728	.19333521	.0476	.1869
5	.37637567	6.47077E-04	3.78097E-03	.84527039	.30581481	.14441138	.46584042	.18500045	.0952	.1711
6	.38257838	6.54642E-04	4.01256E-03	.84957284	.30755919	.14522948	.39424344	.18063760	.1429	.1631
7	.38878110	6.62200E-04	4.21215E-03	.85255097	.30887394	.14612236	.33592204	.17742088	.1905	.1574
8	.39498381	6.71[illegible]E-04	4.37750E-03	.85472620	.30991673	.14778664	.29765069	.17514203	.2381	.1534
9	.40118653	6.80[illegible]E-04	4.52[illegible]E-03	.85630169	.31097072	.14907680	.26391861	.17337490	.2857	.1503
10	.40738924	6.89537E-04	4.65[illegible]E-03	.85744435	.31186948	.15028197	.23679229	.17203154	.3333	.1480
11	.41359196	6.99238E-04	4.78438E-03	.85832241	.31269671	.15127803	.21384550	.17098819	.3810	.1462
12	.41979468	7.09246E-04	4.90072E-03	.85895976	.31348698	.15212666	.19455527	.17014300	.4286	.1447
13	.42599739	7.19910E-04	5.01202E-03	.85942357	.31424930	.15278790	.17789421	.16949115	.4762	.1436
14	.43220011	7.30981E-04	5.11627E-03	.85973504	.31490450	.15330213	.16351654	.16899109	.5238	.1428
15	.43840282	7.42511E-04	5.22373E-03	.85998829	.31548547	.15366375	.15088042	.16850721	.5714	.1421
16	.44460554	7.54651E-04	5.32[illegible]E-03	.86009708	.31602641	.15389508	.13978564	.16851972	.6190	.1417
17	.45080825	7.67245E-04	5.42[illegible]E-03	.86007753	.31653024	.15400610	.12990508	.16813360	.6667	.1413
18	.45701097	7.80[illegible]E-04	5.53[illegible]E-03	.85985233	.31698941	.15400677	.12109602	.16801916	.7143	.1412
19	.46321369	7.94317E-04	5.63125E-03	.85965415	.31721438	.15391328	.11316634	.16795148	.7619	.1411
20	.46941640	8.09036E-04	5.73477E-03	.85937086	.31760518	.15372599	.10602228	.16797348	.8095	.1411
21	.47561912	8.23910E-04	5.83698E-03	.85904277	.31798918	.15346871	.09952469	.16802109	.8571	.1412
22	.48182183	8.40176E-04	5.94399E-03	.85856530	.31307525	.15313086	.09362847	.16813622	.9048	.1413
23	.48802455	8.56202E-04	6.04812E-03	.85815138	.31413450	.15274448	.08820542	.16826458	.9524	.1416
24	.49422726	8.74206E-04	6.16040E-03	.85755568	.31543561	.15228719	.08326364	.16846794	1.0000	.1419

E-18 PHI =150.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.36397023	5.45450E-04	2.42455E-03	.81816095	.29778623	.13026966	.91703047	.21211593	0.0000	.2250
4	.37032200	5.49652E-04	3.22285E-03	.84847056	.30820458	.12015743	.82625930	.18469804	.0476	.1705
5	.37667376	5.54851E-04	3.60379E-03	.85787546	.31072452	.11726179	.37752291	.17535657	.0952	.1537
6	.38302553	5.59547E-04	3.83756E-03	.86204126	.31133980	.11893007	.29970301	.17076770	.1429	.1458
7	.38937729	5.64914E-04	4.01504E-03	.86478599	.31133930	.12055896	.24574624	.16773704	.1905	.1407
8	.39572906	5.70170E-04	4.15181E-03	.86655705	.31113398	.12224823	.20952001	.16572901	.2381	.1373
9	.40208082	5.75810E-04	4.28836E-03	.86788356	.31082126	.12354956	.17941681	.16425820	.2857	.1349
10	.40843259	5.81557E-04	4.36717E-03	.86881600	.31052287	.12463495	.15729510	.16319662	.3333	.1332
11	.41478435	5.87560E-04	4.45648E-03	.86957874	.31025503	.12540948	.13925540	.16238741	.3810	.1318
12	.42113612	5.93817E-04	4.53723E-03	.87012529	.31006157	.12596525	.12467487	.16178786	.4286	.1309
13	.42748788	6.00320E-04	4.61302E-03	.87054595	.30994241	.12629153	.11237260	.16132941	.4762	.1301

14	.43383965	6.07145E-04	4.68480E-03	.87083898	.30992255	.12644620	.10206138	.16099620	.5238	.1296
15	.44019141	6.14250E-04	4.75406E-03	.87104403	.30998921	.12642677	.09314956	.16075153	.5714	.1292
16	.44654319	6.21801E-04	4.82209E-03	.87114925	.31003140	.12626975	.08547829	.16059180	.6190	.1289
17	.45289494	6.29041E-04	4.89090E-03	.87118816	.31043775	.12598152	.07872425	.16049189	.6667	.1288
18	.45924671	6.38093E-04	4.95671E-03	.87115497	.31083710	.12558191	.07279142	.16045755	.7143	.1287
19	.46559847	6.46804E-04	5.02345E-03	.87103254	.31130122	.12508377	.06748756	.16046499	.7619	.1287
20	.47195024	6.56359E-04	5.09040E-03	.87083239	.31193468	.12449567	.06275636	.16052946	.8095	.1288
21	.47836200	6.66071E-04	5.16355E-03	.87060239	.31266634	.12383015	.05848949	.16062057	.8571	.1290
22	.48465377	6.76954E-04	5.23811E-03	.87025719	.31347139	.12309323	.05460368	.16077075	.9048	.1292
23	.49100553	6.87768E-04	5.31118E-03	.86990956	.31433578	.12229644	.05105533	.16093102	.9524	.1295
24	.49735730	7.00216E-04	5.39206E-03	.86941613	.31544650	.12144397	.04783593	.16115859	1.0000	.1299

K=19 PHI =160.0 Z = 1.000000

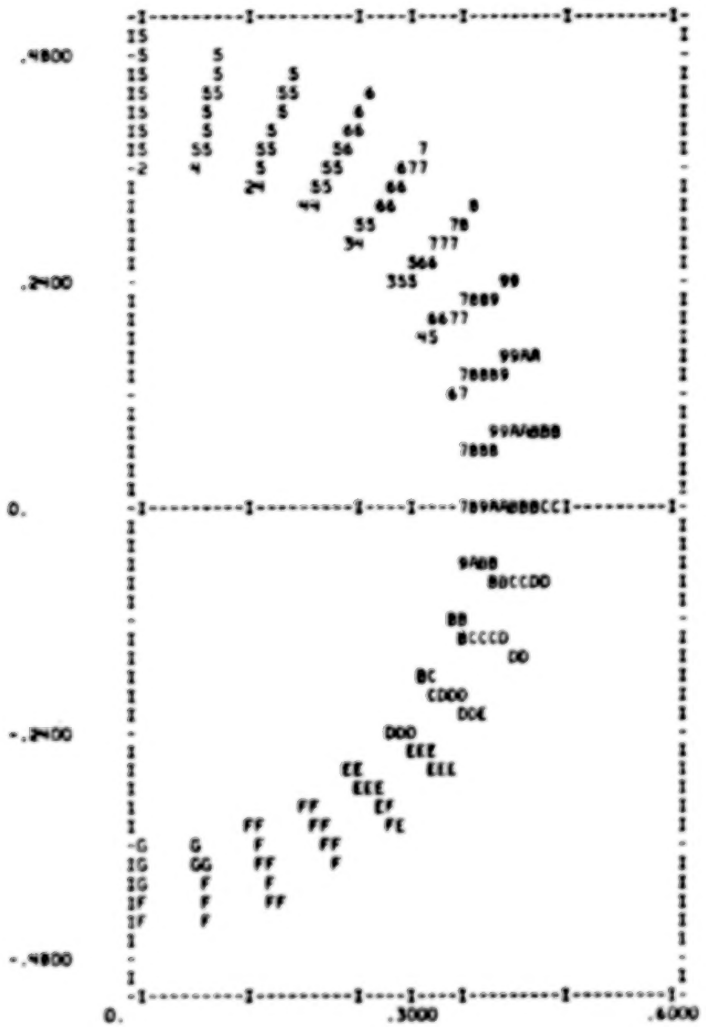
J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	5.07233E-04	2.50200E-03	.82568490	.30052472	.08708835	.91703047	.20992616	0.0000	.2203
4	.37032128	5.08647E-04	3.26846E-03	.86070874	.31293828	.09050071	.42135895	.17593734	.0476	.1548
5	.37667233	5.11277E-04	3.71899E-03	.86989062	.31518949	.08045008	.25342221	.16581731	.0952	.1375
6	.38302337	5.13361E-04	3.90135E-03	.87291235	.31526252	.08401972	.18934701	.16218333	.1429	.1315
7	.38937442	5.15923E-04	4.03206E-03	.87490566	.31484853	.08633705	.14932535	.15997275	.1905	.1280
8	.39572546	5.18260E-04	4.12007E-03	.87612900	.31433860	.08827413	.12566711	.15861704	.2381	.1258
9	.40207651	5.20976E-04	4.19038E-03	.87705788	.31378114	.09035796	.10978316	.15765789	.2857	.1243
10	.40842756	5.23375E-04	4.24725E-03	.87774493	.31328504	.09205534	.09758778	.15698028	.3333	.1232
11	.41477860	5.26011E-04	4.29850E-03	.87830339	.31279057	.09113567	.07980184	.15648511	.3810	.1224
12	.42112965	5.28554E-04	4.35247E-03	.87874415	.31238173	.09150762	.07115159	.15611068	.4286	.1219
13	.42748069	5.31372E-04	4.37697E-03	.87911214	.31202561	.09165217	.06390911	.15582153	.4762	.1214
14	.43383174	5.34190E-04	4.41249E-03	.87940435	.31174347	.09163696	.05788310	.15560408	.5238	.1211
15	.44018279	5.37031E-04	4.44591E-03	.87955242	.31151551	.09146777	.05271666	.15543703	.5714	.1208
16	.44653383	5.40163E-04	4.47833E-03	.87981064	.31132648	.09118191	.04826923	.15531722	.6190	.1206
17	.45288488	5.43329E-04	4.50960E-03	.87999412	.31126708	.09078369	.04435880	.15522975	.6667	.1205
18	.45923593	5.46703E-04	4.54130E-03	.88009178	.31125810	.09029615	.04090506	.15517955	.7143	.1204
19	.46558697	5.50044E-04	4.57250E-03	.88016305	.31129120	.08972061	.03782578	.15515124	.7619	.1204
20	.47193802	5.54380E-04	4.60691E-03	.88017195	.31143629	.08907279	.03501435	.15515051	.8095	.1204
21	.47828906	5.58479E-04	4.63853E-03	.88016337	.31161203	.08834923	.03246822	.15518033	.8571	.1204
22	.48464011	5.63304E-04	4.67469E-03	.88007230	.31193509	.08758944	.03013823	.15524229	.9048	.1205
23	.49099116	5.68130E-04	4.71051E-03	.87997611	.31[illegible].050	.08671927	.02798183	.15531191	.9524	.1206
24	.49734220	5.74063E-04	4.75234E-03	.87976720	.31280688	.08582318	.02599473	.15543224	1.0000	.1208

K=20 PHI =170.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.36397023	4.97409E-04	2.27006E-03	.82957376	.30194016	.01901894	.91703047	.20934041	0.0000	.2191
4	.37016920	4.97184E-04	3.69297E-03	.87378434	.31701593	.03705787	.23530506	.16409145	.0476	.1346
5	.37636816	4.97894E-04	4.04737E-03	.87933067	.31755223	.04028871	.12234541	.15783541	.0952	.1242
6	.38256713	4.97961E-04	4.07231E-03	.88056552	.31688118	.04170072	.09997489	.15638440	.1429	.1223
7	.38876609	4.98413E-04	4.13870E-03	.88174126	.31629500	.04341452	.07824088	.15519494	.1905	.1204
8	.39496505	4.98572E-04	4.17027E-03	.88236257	.31570175	.04480619	.06812276	.15464662	.2381	.1196
9	.40116402	4.99021E-04	4.20179E-03	.88256477	.31518819	.04760045	.05927890	.15411935	.2857	.1188
10	.40736298	4.99503E-04	4.22177E-03	.88258199	.31471323	.04819857	.05220485	.15379776	.3333	.1183
11	.41356195	4.99503E-04	4.24112E-03	.88237088	.31429188	.04851749	.04635121	.15348908	.3810	.1178
12	.41976091	4.99[illegible]E-04	4.22147E-03	.88410342	.31360147	.04871582	.04215467	.15327041	.4286	.1175
13	.42596987	5.00015E-04	4.25001E-03	.88440536	.31[illegible]4266	.04876291	.03815188	.15306115	.4762	.1171
14	.43217884	5.00279E-04	4.27[illegible]E-03	.88466850	.31320533	.04873109	.03510332	.15295823	.5238	.1169
15	.43838780	5.00425E-04	4.23694E-03	.88492427	.31303255	.04860673	.03202197	.15274222	.5714	.1167
16	.44458576	5.00577E-04	4.29051E-03	.88515410	.31257947	.04842669	.02953250	.15261300	.6190	.1165
17	.45079573	5.00842E-04	4.30616E-03	.88538309	.31228913	.04818219	.02715536	.15248520	.6667	.1163
18	.45699469	5.00742E-04	4.31304E-03	.88559404	.31197707	.04789456	.02513845	.15238085	.7143	.1161
19	.46315366	5.00722E-04	4.31868E-03	.88581019	.31167336	.04755471	.02321101	.15227513	.7619	.1159
20	.46935262	5.00765E-04	4.32493E-03	.88601018	.31139744	.04717777	.02147954	.15218284	.8095	.1158
21	.47555158	5.00548E-04	4.32850E-03	.88622238	.31107729	.04675 38	.01984332	.15200889	.8571	.1157
22	.48175055	5.00661E-04	4.33358E-03	.88641523	.31079471	.04628954	.01834143	.15200788	.9048	.1155
23	.48794951	5.00453E-04	4.33667E-03	.88662876	.31047359	.04577440	.01691132	.15192123	.9524	.1154
24	.49414848	5.00485E-04	4.34100E-03	.88681379	.31019947	.04522186	.01557797	.15185031	1.0000	.1153

K=21 PHI =180.0 Z = 1.000000

J	R	P	RHO	U	V	W	(S-SINF)/CV	R	T	M/MT
3	.36397023	4.9624BE-ON	2.26627E-03	.83046139	.30226323	0.00000000	.91703047	.20927056	0.0000	.2190
4	.37002762	4.95676E-ON	3.96812E-03	.87956885	.31850305	0.00000000	.13165870	.15805977	.0476	.1249
5	.37608501	4.95831E-ON	4.13408E-03	.88259927	.31795240	0.00000000	.07461170	.15487899	.0952	.1199
6	.38214239	4.95202E-ON	4.14603E-03	.88318207	.31709745	0.00000000	.06928435	.15455655	.1429	.1194
7	.38819978	4.94814E-ON	4.18780E-03	.88404281	.31650139	0.00000000	.05612998	.15381494	.1905	.1183
8	.39425717	4.94304E-ON	4.19191E-03	.88445002	.31595850	0.00000000	.05707673	.15356978	.2381	.1179
9	.40031455	4.93800E-ON	4.20876E-03	.88493841	.31553479	0.00000000	.04538162	.15318082	.2857	.1173
10	.40637194	4.93403E-ON	4.21945E-03	.88520447	.31513385	0.00000000	.04210463	.15297887	.3333	.1170
11	.41242933	4.92720E-ON	4.22538E-03	.88560163	.31472363	0.00000000	.03775129	.15271645	.3810	.1166
12	.41848671	4.92160E-ON	4.23014E-03	.88585950	.31448597	0.00000000	.03509186	.15254249	.4286	.1163
13	.42454410	4.91523E-ON	4.23584E-03	.88615299	.31415575	0.00000000	.03194093	.15234110	.4762	.1160
14	.43060149	4.90855E-ON	4.23674E-03	.88659815	.31384018	0.00000000	.02952777	.15218585	.5238	.1158
15	.43665887	4.90093E-ON	4.24157E-03	.88665533	.31352249	0.00000000	.02704285	.15201719	.5714	.1155
16	.44271626	4.89288E-ON	4.24250E-03	.88689528	.31319149	0.00000000	.02505719	.15187353	.6190	.1153
17	.44877365	4.88543E-ON	4.24287E-03	.88714930	.31285906	0.00000000	.02302937	.15172168	.6667	.1151
18	.45483104	4.87327E-ON	4.24170E-03	.88739830	.31248919	0.00000000	.02190507	.15158317	.7143	.1149
19	.46088842	4.86113E-ON	4.23940E-03	.88766753	.31205919	0.00000000	.01959850	.15143675	.7619	.1147
20	.46694581	4.84907E-ON	4.23585E-03	.88793966	.31162441	0.00000000	.01808085	.15129865	.8095	.1145
21	.47300320	4.83201E-ON	4.23029E-03	.88824322	.31112853	0.00000000	.01660278	.15114514	.8571	.1142
22	.47906058	4.81482E-ON	4.22361E-03	.88855639	.31059854	0.00000000	.01525083	.15099527	.9048	.1140
23	.48511797	4.79276E-ON	4.21374E-03	.88891931	.30996847	0.00000000	.01393956	.15082574	.9524	.1137
24	.49117536	4.76948E-ON	4.20278E-03	.88929594	.30930387	0.00000000	.01270887	.15065447	1.0000	.1135



VERTICAL SCALING

0.	< 0 <	.800E-03	.80 E-03 < 1 <	.160E-02	
.160E-02	< 2 <	.240E-02	.240 -02 < 3 <	.320E-02	
.320E-02	< 4 <	.400E-02	.400E-02 < 5 <	.480E-02	
.480E-02	< 6 <	.560E-02	.560E-02 < 7 <	.640E-02	
.640E-02	< 8 <	.720E-02	.720E-02 < 9 <	.800E-02	
.800E-02	< A <	.880E-02	.880E-02 < B <	.960E-02	
.960E-02	< C <	.104E-01	.104E-01 < D <	.112E-01	
.112E-01	< E <	.120E-01	.120E-01 < F <	.128E-01	
.128E-01	< G <	.136E-01	.136E-01 < H <	.144E-01	
.144E-01	< I <	.152E-01			

SURFACE FLOW VARIABLES AT Z = 1.000000
X/L = .000100 D2DT=343.454220 ITER= 1500

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	.3640	.6709	2.4012E+01	5.3299E+00	2.3607	.8592	0.0000	2.9735E-01	1.0000	.99204	.00	9.1703E-01
10.0	.3640	.6616	2.3694E+01	5.0821E+00	2.3675	.8617	.0041	2.9677E-01	1.0000	.99036	.00	9.1703E-01
20.0	.3640	.6348	2.2767E+01	4.8421E+00	2.3877	.8691	.1679	2.9508E-01	1.0000	.98536	.00	9.1703E-01
30.0	.3640	.5919	2.1303E+01	4.6175E+00	2.4218	.8815	.2506	2.9229E-01	1.0000	.97717	.00	9.1703E-01
40.0	.3640	.5368	1.9413E+01	4.3211E+00	2.4701	.8990	.3317	2.8844E-01	1.0000	.96598	.00	9.1703E-01
50.0	.3640	.4733	1.7234E+01	3.9889E+00	2.5332	.9220	.4106	2.8357E-01	1.0000	.95207	.00	9.1703E-01
60.0	.3640	.4056	1.4913E+01	3.6769E+00	2.6116	.9505	.4862	2.7777E-01	1.0000	.93578	.00	9.1703E-01
70.0	.3640	.3379	1.2556E+01	3.3719E+00	2.7059	.9848	.5579	2.7113E-01	1.0000	.91757	.00	9.1703E-01
80.0	.3640	.2736	1.0315E+01	3.0843E+00	2.8163	1.0250	.6242	2.6377E-01	1.0000	.89791	.00	9.1703E-01
90.0	.3640	.2155	8.3900E+00	2.8134E+00	2.9429	1.0711	.6835	2.5579E-01	1.0000	.87733	.00	9.1703E-01
100.0	.3640	.1649	6.6577E+00	2.5119E+00	3.0853	1.1230	.7339	2.4755E-01	1.0000	.85640	.00	9.1703E-01
110.0	.3640	.1232	5.2256E+00	2.6622E+00	3.2409	1.1796	.7704	2.3912E-01	1.0000	.83590	.00	9.1703E-01
120.0	.3640	.0899	4.0842E+00	1.4195E+00	3.4064	1.2398	.7886	2.3066E-01	1.0000	.81648	.00	9.1703E-01
130.0	.3640	.0647	3.2203E+00	1.1977E+00	3.5747	1.3011	.7808	2.2316E-01	1.0000	.79899	.00	9.1703E-01
140.0	.3640	.0471	2.6167E+00	1.0530E+00	3.7322	1.3584	.7310	2.1669E-01	1.0000	.78484	.00	9.1703E-01
150.0	.3640	.0367	2.2581E+00	9.2919E-01	3.8571	1.4039	.6141	2.1212E-01	1.0000	.77497	.00	9.1703E-01
160.0	.3640	.0321	2.0999E+00	8.8240E-01	3.9332	1.4316	.4149	2.0993E-01	1.0000	.77034	.00	9.1703E-01
170.0	.3640	.0309	2.0592E+00	8.7015E-01	3.9628	1.4423	.1864	2.0934E-01	1.0000	.76912	.00	9.1703E-01
180.0	.3640	.0307	2.0544E+00	8.6870E-01	3.9684	1.4444	0.0000	2.0927E-01	1.0000	.76897	.00	9.1703E-01

BODY AND SHOCK GEOMETRY AT Z = 1.000

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	.3640	.3640	0.0000	.4900	.4900	0.0000
10.0	.3640	.3640	0.0000	.4903	.4902	.0030
20.0	.3640	.3640	0.0000	.4911	.4910	.0060
30.0	.3640	.3640	0.0000	.4924	.4923	.0092
40.0	.3640	.3640	0.0000	.4943	.4942	.0126
50.0	.3640	.3640	0.0000	.4968	.4967	.0162
60.0	.3640	.3640	0.0000	.4500	.4999	.0201
70.0	.3640	.3640	0.0000	.4538	.4538	.0241
80.0	.3640	.3640	0.0000	.4584	.4584	.0283
90.0	.3640	.3640	0.0000	.4637	.4637	.0321
100.0	.3640	.3640	0.0000	.4696	.4696	.0352
110.0	.3640	.3640	0.0000	.4760	.4760	.0373
120.0	.3640	.3640	0.0000	.4826	.4827	.0371
130.0	.3640	.3640	0.0000	.4889	.4890	.0333
140.0	.3640	.3640	0.0000	.4942	.4943	.0242
150.0	.3640	.3640	0.0000	.4974	.4974	.0089
160.0	.3640	.3640	0.0000	.4973	.4974	-.0092
170.0	.3640	.3640	0.0000	.4941	.4942	-.0177
180.0	.3640	.3640	0.0000	.4912	.4912	0.0000

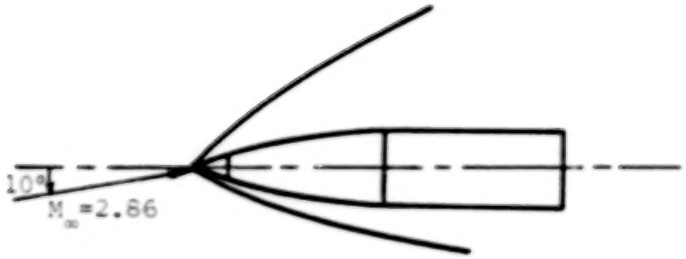
```
     REF. AREA =     .785398 REF. LENGTH =   1.000000
Z=  1.000000
DCY,DCN,DCA,CY,CN,CA= -.16223537E+06  .15764677E+06  .10116989E+06 -.16223537E+06  .15764677E+06  .10116989E+06
DMX,DMY,DMZ,CMX,CMY,CMZ= -.94998641E+08 -.97763753E+08 0.             -.94998641E+08 -.97763753E+08 0.
```

```
REF. AREA =    .785398 REF. LENGTH =   1.000000
NORMAL FORCE COEFFICIENT =     .157647E+06          LIFT COEFFICIENT =     .126090E+06
  SIDE FORCE COEFFICIENT =    -.162235E+06          YAW  COEFFICIENT =    -.162235E+06
 AXIAL FORCE COEFFICIENT =     .101170E+06          DRAG COEFFICIENT =     .138525E+06

PITCHING MOMENT COEFFICIENT =    -.994998E+08
    SIDE MOMENT COEFFICIENT =     .977638E+08
 ROLLING MOMENT COEFFICIENT =    0.

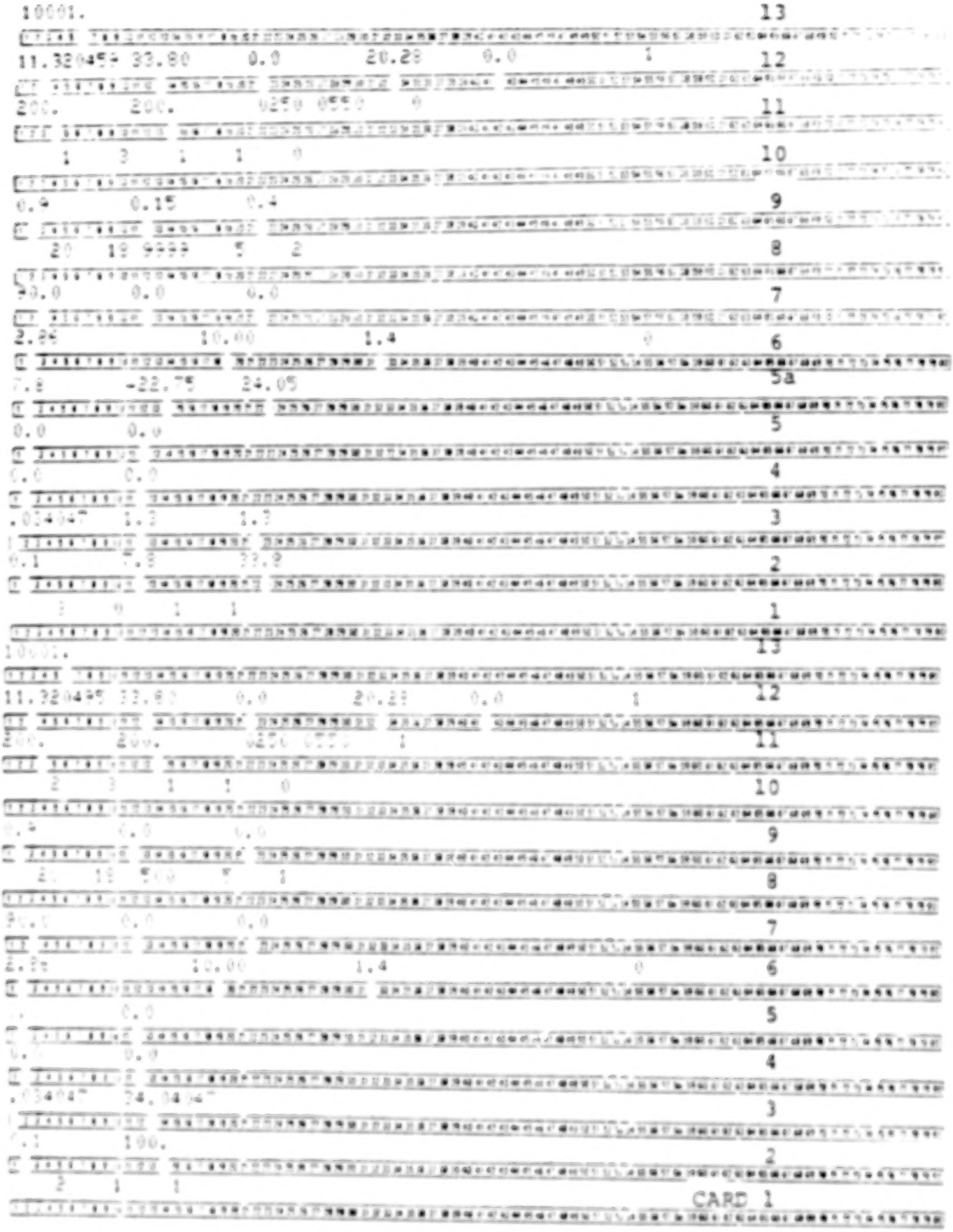
CENTER OF PRESSURE=    .602604E+03 BASED ON REF. LENGTH=    .100000E+01 AND MOMENT REF. CENTER=   0.
 STATIC STABILITY MARGIN =     .602604E+03 BASED ON REF. LENGTH =     .100000E+01 AND C.G. LOCATION =    0.
```

3. SECOND TEST CASE: CONE-OGIVE-CYLINDER



This problem is run as two stacked cases (NCASE > 0). The first part of the solution is to obtain a pointed-cone starting solution; this solution is then used to start the integration down the ogive-cylinder body. The slopes at the cone-ogive intersection are matched, thus causing a ZSHIFT≠0. This is a case which covers most of the options of the code except that force and moment calculations are not made. The input cards used are now listed and follow the formats displayed in section 2.

Sample Input for Second Test Case



The output listing for this test case is now displayed. The variable definitions and normalizations described in section 2 are, of course, still applicable. The output consists of the following sections:

1. Printout of the input quantities.
2. Printout of the free-stream velocity field and computational mesh.
3. Intermediate printout of the shock and body variables controlled by card 11.
4. The converged (starting) flow field reset to the initial z plane using the conical property of this converged solution.
5. Line-printer plot of the normalized density field at the initial z plane for the ogive-cylinder solution.
6. Shock and body variables at this initial z plane.
7. Input quantities for the ogive-cylinder case.
8. Printout of the free-stream velocity field and computational mesh for this case.
9. Flow field, line-printer plot of normalized density, and shock and body variables at z-initial (same as items 4, 5, and 6 above).
10. Intermediate printout of the shock and body variables for the ogive-cylinder solution (controlled by card 11).
11. Intermediate printout of the flow field and line-printer plot of the normalized density field controlled by card 11.
12. Flow field, line-printer plot of the normalized density field, and shock and body variables at the final z station of the ogive-cylinder solution.

```
&SEG,&END     2     1     1     0     0     0     0     0
 2SEG      .10000 100.00000      -1      -1      -1      -1      -1
 3SEG      .03425  94.04947      -1      -1      -1      -1      -1
 0SEG    0.00000   0.66300      -1      -1      -1      -1      -1
 4SEG    0.00000   0.00300      -1      -1      -1      -1      -1
```

MACH = 2.860000
ALPHA = 10.000000
GAMMA = 1.400
SIGMA = 18.90

Z-INITIAL = .10
Z-FINAL = 100.00
PHI-ZERO = 90.00

NIT = 20
NIPHI = 18
METHOD CHOICE = 2
NITER = 100
NPRNT = 0
IPRNT = 1
NCONE = 1
NUPPER= 0
NTAIL = 0

DZ/DT = 0.000 INITIALLY
DELTA-X = 0.000
DELTA-Y = 0.000

DIR1 = 2
DIR2 = 3
TAU1 = 1
TAU2 = 1

PERCENT OF MAX. STEPSIZE = .90
METHOD = 2
PHI. COND. = 1
BETA=0.000
OMEGA= 0.000

FINF = .936300E-01 PHIIN = .886+01E 01 QINF = .787/09E+00

CASCON= 1.716OE+03

K = 1	PHI= 0.000000	UINF=	.771810	VINF=	-.136+00	WINF=	0.0[illegible]
K = 2	PHI= 10.000000	UINF=	.771810	VINF=	-.134721	WINF=	[illegible]
K = 3	PHI= 20.000000	UINF=	.771810	VINF=	-.13[illegible]	WINF=	[illegible]
K = 4	PHI= 30.000000	UINF=	.771810	VINF=	-.131+00	WINF=	[illegible]
K = 5	PHI= 40.000000	UINF=	.771810	VINF=	-.13[illegible]	WINF=	[illegible]
K = 6	PHI= 50.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 7	PHI= 60.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 8	PHI= 70.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 9	PHI= 80.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 10	PHI= 90.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 11	PHI= 80.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 12	PHI= 90.000000	UINF=	.771810	VINF=	-.[illegible]	WINF=	[illegible]
K = 13	PHI=100.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 14	PHI=110.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 15	PHI=120.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 16	PHI=130.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 17	PHI=140.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 18	PHI=150.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 19	PHI=160.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 20	PHI=170.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]
K = 21	PHI=180.000000	UINF=	.771810	VINF=	[illegible]	WINF=	[illegible]

RADIAL MESH DESCRIPTION

J= 3	TAU= 0.		RI = 0.		TRI =	TRIT = 0.
J= 4	TAU=	.478.2E-01	RI =	.476.9E-01	TRI =	TRIT = 0.
J= 5	TAU=	.95.74E-01	RI =	.95.74E-01	TRI =	TRIT = 0.
J= 6	TAU=	.1424#E+00	RI =	.1424.E+00	TRI =	TRIT = 0.
J= 7	TAU=	.1902.E+00	RI =	.1907.E+00	TRI =	TRIT = 0.
J= 8	TAU=	.2381E+00	RI =	.2381E+00	TRI =	TRIT = 0.
J= 9	TAU=	.2857E+00	RI =	.2857E+00	TRI =	TRIT = 0.
J=10	TAU=	.3333E+00	RI =	.3333E+00	TRI =	TRIT = 0.
J=11	TAU=	.3811E+00	RI =	.3811E+00	TRI =	TRIT = 0.
J=12	TAU=	.4286E+00	RI =	.4286E+00	TRI =	TRIT = 0.
J=13	TAU=	.4761E+00	RI =	.4761E+00	TRI =	TRIT = 0.
J=14	TAU=	.5238E+00	RI =	.5238E+00	TRI =	TRIT = 0.
J=15	TAU=	.5714E+00	RI =	.5714E+00	TRI =	TRIT = 0.
J=16	TAU=	.6190E+00	RI =	.6190E+00	TRI =	TRIT = 0.
J=17	TAU=	.6667E+00	RI =	.6667E+00	TRI =	TRIT = 0.
J=18	TAU=	.7143E+00	RI =	.7143E+00	TRI =	TRIT = 0.
J=19	TAU=	.7619E+00	RI =	.7619E+00	TRI =	TRIT = 0.
J=20	TAU=	.8095E+00	RI =	.8095E+00	TRI =	TRIT = 0.
J=21	TAU=	.8571E+00	RI =	.8571E+00	TRI =	TRIT = 0.
J=22	TAU=	.9048E+00	RI =	.9048E+00	TRI =	TRIT = 0.
J=23	TAU=	.9524E+00	RI =	.9524E+00	TRI =	TRIT = 0.
J=24	TAU=	.1000E+01	RI =	.1000E+01	TRI =	TRIT = 0.

MERIDIANAL MESH DESCRIPTION

K	ETA	PHI	DTIL	DTILE
K= 2	ETA= -.1745E+00	PHI= -.1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 3	ETA= 0.	PHI= 0.	DTIL= .1000E+01	DTILE= 0.
K= 4	ETA= .1745E+00	PHI= .1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 5	ETA= .3491E+00	PHI= .3491E+00	DTIL= .1000E+01	DTILE= 0.
K= 6	ETA= .5236E+00	PHI= .5236E+00	DTIL= .1000E+01	DTILE= 0.
K= 7	ETA= .6981E+00	PHI= .6981E+00	DTIL= .1000E+01	DTILE= 0.
K= 8	ETA= .8727E+00	PHI= .8727E+00	DTIL= .1000E+01	DTILE= 0.
K= 9	ETA= .1047E+01	PHI= .1047E+01	DTIL= .1000E+01	DTILE= 0.
K=10	ETA= .1222E+01	PHI= .1222E+01	DTIL= .1000E+01	DTILE= 0.
K=11	ETA= .1396E+01	PHI= .1396E+01	DTIL= .1000E+01	DTILE= 0.
K=12	ETA= .1571E+01	PHI= .1571E+01	DTIL= .1000E+01	DTILE= 0.
K=13	ETA= .1745E+01	PHI= .1745E+01	DTIL= .1000E+01	DTILE= 0.
K=14	ETA= .1920E+01	PHI= .1920E+01	DTIL= .1000E+01	DTILE= 0.
K=15	ETA= .2094E+01	PHI= .2094E+01	DTIL= .1000E+01	DTILE= 0.
K=16	ETA= .2269E+01	PHI= .2269E+01	DTIL= .1000E+01	DTILE= 0.
K=17	ETA= .2443E+01	PHI= .2443E+01	DTIL= .1000E+01	DTILE= 0.
K=18	ETA= .2618E+01	PHI= .2618E+01	DTIL= .1000E+01	DTILE= 0.
K=19	ETA= .2793E+01	PHI= .2793E+01	DTIL= .1000E+01	DTILE= 0.
K=20	ETA= .2967E+01	PHI= .2967E+01	DTIL= .1000E+01	DTILE= 0.
K=21	ETA= .3142E+01	PHI= .3142E+01	DTIL= .1000E+01	DTILE= 0.
K=22	ETA= .3316E+01	PHI= -.2967E+01	DTIL= .1000E+01	DTILE= 0.

SURFACE FLOW VARIABLES AT Z = .945000

X/L = .009451 DZDT= .163362 ITER= 250

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	.3217	.4982	3.8524E+00	2.4016E+00	1.7814	.6064	0.0000	3.4217E-01	1.0000	.58540	.00	6.7798E-02
10.0	.3217	.4935	3.8221E+00	2.4021E+00	1.7854	.6078	.0550	3.4177E-01	1.0000	.58411	.00	6.7798E-02
20.0	.3217	.4787	3.7467E+00	2.4444E+00	1.7063	.6115	.1119	3.4074E-01	1.0000	.58350	.00	6.7798E-02
30.0	.3217	.4554	3.6078E+00	2.3873E+00	1.8248	.6178	.1661	3.3944E-01	1.0000	.57452	.00	6.7798E-02
40.0	.3217	.4252	3.4344E+00	2.3[illegible]E+00	1.8409	.6264	.2190	3.3[illegible]E-01	1.0000	.56650	.00	6.7798E-02
50.0	.3217	.3895	3.2248E+00	2.2013E+00	1.8726	.6394	.2696	3.3[illegible]E-01	1.0000	.55465	.00	6.7798E-02
60.0	.3217	.3503	3.0[illegible]E+00	2.0918E+00	1.9112	.6506	.3147	3.3[illegible]E-01	1.0000	.54532	.00	6.7798E-02
70.0	.3217	.3098	2.7744E+00	1.9744E+00	1.9555	.6617	.3781	3.2[illegible]E-01	1.0000	.53297	.00	6.7798E-02
80.0	.3217	.2699	2.5455E+00	1.8537E+00	2.0044	.6623	.3450	3.2[illegible]E-01	1.0000	.52005	.00	6.7798E-02
90.0	.3217	.2323	2.3[illegible]E+00	1.7[illegible]E+00	2.0566	.7001	.3711	3.19[illegible]E-01	1.0000	.50705	.00	6.7798E-02
100.0	.3217	.1963	2.1[illegible]E+00	1.6371E+00	2.1105	.7185	.4756	3.14531E-01	1.0000	.49457	.00	6.7798E-02
110.0	.3217	.1692	1.9[illegible]E+00	1.5[illegible]E+00	2.1625	.7381	.3[illegible]	3.1[illegible]E-01	1.0000	.48322	.00	6.7798E-02
120.0	.3217	.1455	1.81[illegible]E+00	1.4[illegible]E+00	2.2102	.7[illegible]	.3[illegible]	3.0775E-01	1.0000	.47310	.00	6.7798E-02
130.0	.3217	.1278	1.7361E+00	1.4[illegible]E+00	2.2507	.7761	.2649	3.0[illegible]E-01	1.0000	.46582	.00	6.7798E-02
140.0	.3217	.1156	1.6[illegible]E+00	1.3[illegible]E+00	2.2819	.7784	.2284	3.0[illegible]E-01	1.0000	.46041	.00	6.7798E-02
150.0	.3217	.1086	1.6217E+00	1.3457E+00	2.3030	.7833	.1688	3.02[illegible]E-01	1.0000	.45718	.00	6.7798E-02
160.0	.3217	.1053	1.6031E+00	1.3348E+00	2.3112	.7848	.1087	3.0194E-01	1.0000	.45568	.00	6.7798E-02
170.0	.3217	.1044	1.5970E+00	1.3311E+00	2.3150	.7880	.0567	3.0175E-01	1.0000	.45525	.00	6.7798E-02
180.0	.3217	.1042	1.5968E+00	1.3306E+00	2.3160	.7884	0.0000	3.0173E-01	1.0000	.45516	.00	6.7798E-02

BODY AND SHOCK GEOMETRY AT Z = .945

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	.3217	.3404	0.0000	.4880	.5139	0.0000
10.0	.3217	.3404	0.0000	.4897	.5135	.0076
20.0	.3217	.3404	0.0000	.4917	.5157	.0152
30.0	.3217	.3404	0.0000	.4951	.5189	.0239
40.0	.3217	.3404	0.0000	.4997	.5242	.0307
50.0	.3217	.3404	0.0000	.5058	.5304	.0384
60.0	.3217	.3404	0.0000	.5131	.5391	.0460
70.0	.3217	.3404	0.0000	.5218	.5441	.0531
80.0	.3217	.3404	0.0000	.5317	.5606	[illegible]
90.0	.3217	.3404	0.0000	.5426	.5701	[illegible]
100.0	.3217	.3404	0.0000	.5541	.5894	.0687
110.0	.3217	.3404	0.0000	.5658	.6052	[illegible]
120.0	.3217	.3404	0.0000	.5779	.6205	[illegible]
130.0	.3217	.3404	0.0000	.5882	.6355	[illegible]
140.0	.3217	.3404	0.0000	.5981	.6437	[illegible]

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150.0	.3217	.3404	0.0000	.6066	.6520	.0433
160.0	.3217	.3404	0.0000	.6132	.6592	.0510
170.0	.3217	.3404	0.0000	.6175	.6621	.0161
180.0	.3217	.3404	0.0000	.6189	.6633	0.0000

SURFACE FLOW VARIABLES AT Z = 7.0469[illegible]

X/L = .070470 DZDT= 1.1492E08 ITER= 100

PHI	RB	CP	P/PINF	R/PINF	M-Z	M-R	M-PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	2.3988	.5004	3.8650E+00	2.5012E+00	1.7784	.6054	0.0000	3.4241E 01	1.0000	.58622	.00	6.8463E-02
10.0	2.3988	.4954	3.8361E+00	2.4870E+00	1.7820	.6066	.0616	3.42[illegible] 01	1.0000	.58458	.00	6.8463E-02
20.0	2.3988	.4809	3.75[illegible]E+00	2.[illegible]E+00	1.79[illegible]	.6102	.1227	3.40[illegible] 01	1.0000	.58153	.00	6.8463E-02
30.0	2.3988	.4576	3.6[illegible]E+00	2.3571E+00	1.8103	.6162	.1823	3.3[illegible] 01	1.0000	.57537	.00	6.8463E-02
40.0	2.3988	.4272	3.44[illegible]E+00	2.50[illegible]E+00	1.8347	.6245	.2395	3.36[illegible] 01	1.0000	.56731	.00	6.8463E-02
50.0	2.3988	.3913	3.2[illegible]E+00	2.2[illegible]E+00	1.8[illegible]	.6350	.2936	3.33[illegible] 01	1.0000	.55742	.00	6.8463E-02
60.0	2.3988	.3518	3.0[illegible]E+00	2.[illegible]E+00	1.[illegible]	.6478	.3433	3.3[illegible] 01	1.0000	.54605	.00	6.8463E-02
70.0	2.3988	.3110	2.78[illegible]E+00	1.9[illegible]E+00	1.9[illegible]	.66[illegible]	.3870	3.2[illegible] 01	1.0000	.53360	.00	6.8463E-02
80.0	2.3988	.2707	2.5[illegible]E+00	1.8[illegible]E+00	1.9916	.6778	.4233	3.2[illegible] 01	1.0000	.52055	.00	6.8463E-02
90.0	2.3988	.2327	2.33[illegible]E+00	1.7438E+00	2.0419	.6949	.45[illegible]	3.19[illegible] 01	1.0000	.50746	.00	6.8463E-02
100.0	2.3988	.1985	2.13[illegible]E+00	1.6371E+00	2.0[illegible]	.7124	.4651	3.1[illegible] 01	1.0000	.49489	.00	6.8463E-02
110.0	2.3988	.1692	1.9[illegible]E+00	1.[illegible]E+00	2.1434	.7296	.4643	3.1[illegible] 01	1.0000	.48346	.00	6.8463E-02
120.0	2.3988	.1456	1.8[illegible]E+00	1.[illegible]E+00	2.1907	.7457	.4457	3.07[illegible] 01	1.0000	.47375	.00	6.8463E-02
130.0	2.3988	.1270	1.73[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.76[illegible]	.4073	3.0[illegible] 01	1.0000	.46[illegible]	.00	6.8463E-02
140.0	2.3988	.1154	1.66[illegible]E+00	1.36[illegible]E+00	2.2672	.7718	.3480	3.05[illegible] 01	1.0000	.46054	.00	6.8463E-02
150.0	2.3988	.1075	1.6156E+00	1.3[illegible]E+00	2.2957	.7808	.2692	3.02[illegible] 01	1.0000	.45691	.00	6.8463E-02
160.0	2.3988	.1029	1.58[illegible]E+00	1.3[illegible]E+00	2.3116	.7869	.1787	3.01[illegible] 01	1.0000	.45477	.00	6.8463E-02
170.0	2.3988	.10[illegible]	1.57[illegible]E+00	1.31[illegible]E+00	2.3[illegible]	.79[illegible]	.0[illegible]	3.01[illegible] 01	1.0000	.45368	.00	6.8463E-02
180.0	2.3988	.0998	1.5718E+00	1.3114E+00	2.3[illegible]	.7913	0.0000	3.01[illegible] 01	1.0000	.45328	.00	6.8463E-02

BODY AND SHOCK GEOMETRY AT Z = 7.047

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	2.3988	.3404	0.0000	3.8294	.5150	0.0000
10.0	2.3988	.3404	0.0000	3.8343	.5156	.0548
20.0	2.3988	.3404	0.0000	3.8488	.5176	.1100
30.0	2.3988	.3404	0.0000	3.8727	.5210	.1657
40.0	2.3988	.3404	0.0000	3.[illegible]	.52[illegible]	.2225
50.0	2.3988	.3404	0.0000	3.[illegible]	.53[illegible]	.2781
60.0	2.3988	.3404	0.0000	3.8[illegible]	.53[illegible]	.33[illegible]
70.0	2.3988	.3404	0.0000	3.8676	.5497	.3915
80.0	2.3988	.3404	0.0000	3.9405	.5591	.4441
90.0	2.3988	.3404	0.0000	4.0226	.5704	.4901
100.0	2.3988	.3404	0.0000	4.1116	.5854	.5208
110.0	2.3988	.3404	0.0000	4.2065	.5969	.5521
120.0	2.3988	.3404	0.0000	4.3043	.6109	.5590
130.0	2.3988	.3404	0.0000	4.4016	.6248	.5[illegible]
140.0	2.3988	.3404	0.0000	4.49[illegible]	.6380	.4[illegible]
150.0	2.3988	.3404	0.0000	4.5[illegible]	.64[illegible]	.41[illegible]
160.0	2.3988	.3404	0.0000	4.65[illegible]	.65[illegible]	.2[illegible]
170.0	2.3988	.3404	0.0000	4.6786	.6654	.1534
180.0	2.3988	.3404	0.0000	4.6917	.6674	0.0000

CONE SOLUTION RESET TO Z-INITIAL= .10000

K= 3 PHI = 0.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.0[illegible]	1.29[illegible]E-01	2.2172[illegible]E-01	.6[illegible]	.2072[illegible]	0.[illegible]	[illegible]	.342[illegible]989	0.0000	.5862
4	.0[illegible]212	1.29[illegible]E-01	2.216[illegible]E-01	.6[illegible]	.20[illegible]	0.[illegible]	[illegible]	.342[illegible]	.0476	.5862
5	.0[illegible]	1.29[illegible]E-01	2.21[illegible]E-01	.61[illegible]	.19[illegible]	0.[illegible]	[illegible]	.34231439	.0952	.5859
6	.0[illegible]	1.29[illegible]E-01	2.210[illegible]E-01	.61[illegible]	.1871[illegible]	0.[illegible]	[illegible]	.3421[illegible]610	.1429	.5855
7	.0[illegible]	1.29[illegible]E-01	2.2053[illegible]E-01	.61[illegible]	.18[illegible]	0.[illegible]	[illegible]	.342[illegible]	.1905	.5850
8	.0[illegible]	1.28[illegible]E-01	2.19[illegible]E-01	.62[illegible]	.17[illegible]	0.[illegible]	[illegible]	.3419[illegible]	.2381	.5843
9	.0[illegible]	1.27[illegible]E-01	2.19[illegible]E-01	.6[illegible]	.16[illegible]	0.[illegible]	[illegible]	.3416[illegible]	.2857	.5835
10	.0[illegible]	1.27[illegible]E-01	2.18[illegible]E-01	.6[illegible]	.16[illegible]	0.[illegible]	[illegible]	.3413[illegible]	.3333	.5827
11	.0[illegible]	1.265[illegible]E-01	2.17[illegible]E-01	.6[illegible]	.15[illegible]	0.[illegible]	[illegible]	.3410[illegible]	.3810	.5817

12	.04152463	1.25725E-01	2.16514E-01	.62905276	.15370965	0.00000000	.06845970	.34078321	.4286	.5807
13	.04235619	1.24876E-01	2.15484E-01	.63119451	[illegible]	0.00000000	.06845970	.34045197	.4762	.5795
14	.04318776	1.23951E-01	2.14393E-01	[illegible]	.14735658	0.00000000	.06845970	[illegible]	.5238	.5783
15	.04401932	1.22998E-01	2.13152E-01	.63530279	[illegible]	0.00000000	.06845970	.33971811	.5714	.5770
16	.04485088	1.21983E-01	2.11994E-01	.63737660	[illegible]	0.00000000	.06845970	.33931615	.6190	.5757
17	.04568245	1.20914E-01	[illegible]	[illegible]	[illegible]	0.00000000	.06845970	[illegible]	.6667	.5742
18	.04651401	1.19744E-01	2.09178E-01	[illegible]	[illegible]	0.00000000	.06845970	[illegible]	.7143	.5727
19	.04734557	[illegible]	2.07714E-01	[illegible]	[illegible]	0.00000000	.06845970	.33796672	.7619	.5711
20	.04817714	[illegible]	2.06184E-01	[illegible]	[illegible]	0.00000000	.06845970	[illegible]	.8095	.5694
21	.04900870	1.16114E-01	[illegible]	.64765739	[illegible]	0.00000000	.06845970	[illegible]	.8571	.5676
22	.04984026	1.14791E-01	[illegible]	.65015546	[illegible]	0.00000000	.06845970	[illegible]	.9048	.5658
23	.05067183	1.13346E-01	[illegible]	[illegible]	[illegible]	0.00000000	.06845970	.33577517	.9524	.5637
24	.05150339	1.11961E-01	1.99308E-01	.65462775	.09856234	0.00000000	.06845970	.33510591	1.0000	.5617

K= 4 PHI = 10.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404056	1.29025E-01	2.20561E-01	.60952474	.20748505	.02108710	[illegible]	.34204821	0.0000	.5850
4	.03487539	[illegible]	2.20490E-01	.61185377	[illegible]	[illegible]	[illegible]	.34205567	.0476	.5850
5	.03571022	[illegible]	[illegible]	[illegible]	.19578419	[illegible]	[illegible]	.34196877	.0952	.5847
6	.03654505	1.28507E-01	[illegible]	.61654921	.18745174	[illegible]	.06841707	.34184625	.1429	.5843
7	.03737988	[illegible]	2.19471E-01	[illegible]	[illegible]	[illegible]	[illegible]	.34167620	.1905	.5837
8	.03821471	1.27613E-01	2.18876E-01	.62165115	[illegible]	[illegible]	[illegible]	.34149344	.2381	.5831
9	.03904954	1.27049E-01	2.18195E-01	.62524799	[illegible]	[illegible]	.06811724	.34125213	.2857	.5823
10	.03988437	1.26403E-01	2.17410E-01	[illegible]	.16440438	[illegible]	[illegible]	[illegible]	.3333	.5814
11	.04071920	1.25684E-01	[illegible]	.62752472	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.5804
12	.04155403	1.24917E-01	[illegible]	[illegible]	[illegible]	[illegible]	.06795558	[illegible]	.4286	.5794
13	.04238886	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4762	.5782
14	.04322369	1.23191E-01	[illegible]	[illegible]	.14494730	[illegible]	[illegible]	.33971770	.5238	.5770
15	.04405852	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.5758
16	.04489335	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.5744
17	.04572818	1.20187E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.5730
18	.04656301	[illegible]	2.08394E-01	.64211131	[illegible]	[illegible]	.06771462	[illegible]	.7143	.5714
19	.04739784	1.17653E-01	[illegible]	.64421333	.12143878	[illegible]	.06769480	.33758975	.7619	.5698
20	.04823267	1.16728E-01	2.05451E-01	[illegible]	.11701283	[illegible]	[illegible]	.33709179	.8095	.5682
21	.04906750	1.15457E-01	2.03857E-01	[illegible]	[illegible]	[illegible]	[illegible]	.33656250	.8571	.5664
22	.04990233	1.14152E-01	2.02210E-01	[illegible]	[illegible]	[illegible]	[illegible]	.33601255	.9048	.5645
23	.05073716	1.12725E-01	2.00404E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.5625
24	.05157199	1.11394E-01	[illegible]	.65514775	[illegible]	[illegible]	[illegible]	.33481527	1.0000	.5605

K= 5 PHI = 20.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404056	1.26225E-01	2.17131E-01	.61124959	.20807219	.04184351	[illegible]	.34097772	0.0000	.5813
4	.03488506	[illegible]	[illegible]	[illegible]	.20114519	[illegible]	[illegible]	.34090336	.0476	.5811
5	.03572956	[illegible]	2.17144E-01	.61618790	[illegible]	[illegible]	[illegible]	[illegible]	.0952	.5807
6	.03657406	[illegible]	2.16871E-01	[illegible]	[illegible]	[illegible]	[illegible]	.34068310	.1429	.5803
7	.03741856	[illegible]	[illegible]	[illegible]	[illegible]	.04171316	[illegible]	.34048772	.1905	.5797
8	.03826307	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.5790
9	.03910757	[illegible]	[illegible]	.62519212	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.5782
10	.03995207	[illegible]	2.14637E-01	[illegible]	.16565893	[illegible]	[illegible]	.33981075	.3333	.5774
11	.04079657	[illegible]	2.13835E-01	[illegible]	[illegible]	[illegible]	[illegible]	.33952867	.3810	.5764
12	.04164107	[illegible]	2.12549E-01	[illegible]	.15546739	[illegible]	[illegible]	[illegible]	.4286	.5754
13	.04248558	1.21734E-01	2.11987E-01	.63359679	.15038650	[illegible]	[illegible]	[illegible]	.4762	.5743
14	.04333008	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.5731
15	.04417458	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.5718
16	.04501908	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.5705
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.33735765	.6667	.5691
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.33691621	.7143	.5676
19	.04755259	1.15690E-01	2.04737E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.5660
20	.04839709	[illegible]	2.03289E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.5643
21	.04924159	1.13507E-01	2.01755E-01	.65013698	.11461450	[illegible]	[illegible]	.33543392	.8571	.5626
22	.05008609	1.12251E-01	2.00167E-01	.65227411	.11050710	[illegible]	[illegible]	[illegible]	.9048	.5608
23	.05093059	[illegible]	1.98426E-01	[illegible]	.10588582	[illegible]	[illegible]	.33430430	.9524	.5588
24	.05177510	1.09549E-01	1.96731E-01	[illegible]	.10160711	[illegible]	[illegible]	.33371983	1.0000	.5568

K= 6 PHI = 30.0 Z = .1000(7)

J	R	P	RHO	U	V	W	(1.5194 J/CV	A	T	M/MT
3	.C5[illegible]056	1.2[illegible]E-01	2.1[illegible]E-01	6[illegible]	.209[illegible]	0[illegible]	0[illegible]	.3392[illegible]	0.0000	.5754
4	.05[illegible]	1.2[illegible]E-01	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0476	.5746
5	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0952	.5742
6	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.5737
7	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.5731
8	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.5724
9	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.5716
10	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.5709
11	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.5699
12	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4286	.5688
13	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4762	.5678
14	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.5666
15	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.5654
16	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.5641
17	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.5627
18	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.5613
19	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.5598
20	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.5582
21	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8571	.5565
22	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9048	.5548
23	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.5528
24	.05[illegible]	1.2[illegible]	2.1[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0000	.5509

K= 7 PHI = 40.0 Z = 1000(.0)

J	R	P	RHO	U	V	W	(1.5194 J/CV	A	T	M/MT
3	.C5[illegible]056	1.158[illegible]E-01	2.0[illegible]E-01	6[illegible]	.210[illegible]	0[illegible]	0[illegible]	.3368[illegible]	0.0000	.5673
4	.05[illegible]	1.16[illegible]E-01	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0476	.5660
5	.05[illegible]	1.16[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0952	.5653
6	.05[illegible]	1.15[illegible]E-01	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.5648
7	.05[illegible]	1.15[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.5642
8	.05[illegible]	1.15[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.5635
9	.05[illegible]	1.15[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.5628
10	.05[illegible]	1.14[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.5620
11	.05[illegible]	1.14[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.5611
12	.05[illegible]	1.13[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4286	.5601
13	.05[illegible]	1.13[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4762	.5591
14	.05[illegible]	1.12[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.5580
15	.05[illegible]	1.11[illegible]	2.0[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.5568
16	.05[illegible]	1.1[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.5556
17	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.5543
18	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.5529
19	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.5515
20	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.5499
21	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8571	.5483
22	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9048	.5467
23	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.5448
24	.05[illegible]	1.[illegible]	1.9[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0000	.5430

K= 8 PHI = 50.0 Z = 1[illegible]

J	R	P	RHO	U	V	W	(1.5194 J/CV	A	T	M/MT
3	.05[illegible]056	1.09[illegible]E-01	1.95[illegible]	6[illegible]	.212[illegible]	0[illegible]	0[illegible]	.3338[illegible]	0.0000	.5574
4	.05[illegible]	1.09[illegible]	1.96[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0476	.5553
5	.05[illegible]	1.09[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0952	.5545
6	.05[illegible]	1.09[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.5539
7	.05[illegible]	1.09[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.5533
8	.05[illegible]	1.09[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.5527
9	.05[illegible]	1.09[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.5520
10	.05[illegible]	1.08[illegible]	1.97[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.5512

11	.04194817	1.08147E-01	1.96579E-01	.64217587	.16987965	.07594573	.05965160	.33176867	.3810	.5504
12	.04225937	1.07608E-01	1.95[illegible]E-01	[illegible]	.16[illegible]	[illegible]	[illegible]	.33246847	.4286	.5495
13	.04737250	1.07173E-01	1.95[illegible]E-01	[illegible]	.15[illegible]550	[illegible]	[illegible]	.33220745	.4762	.5485
14	.04[illegible]578	1.06[illegible]E-01	1.94[illegible]E-01	[illegible]	.15[illegible]	[illegible]	[illegible]	.33189786	.5238	.5475
15	.04469050	1.05776E-01	1.93549E-01	[illegible]	.15[illegible]	[illegible]	.05[illegible]	.33156834	.5714	.5464
16	.04591218	1.05[illegible]E-01	1.93[illegible]E-01	[illegible]	.14[illegible]52	[illegible]	.05117010	.33121991	.6190	.5452
17	.04[illegible]138	1.04585E-01	1.92[illegible]E-01	[illegible]	.14[illegible]	[illegible]	[illegible]	.32985157	.6667	.5440
18	.04772859	1.0[illegible]E-01	1.91[illegible]E-01	[illegible]	.13[illegible]	[illegible]	[illegible]	[illegible]	.7143	.5427
19	.04[illegible]	1.0[illegible]E-01	1.9[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.5414
20	.04[illegible]	1.0[illegible]E-01	1.89[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32962138	.8095	.5400
21	.05047819	1.00[illegible]E-01	1.87[illegible]E-01	.66111[illegible]	.12[illegible]	[illegible]	[illegible]	.32816117	.8571	.5384
22	.05139139	1.00578E-01	1.86730E-01	.66[illegible]3748	.12[illegible]	[illegible]	[illegible]	.32768529	.9048	.5369
23	.05253440	9.9195E-02	1.85534E-01	.66567248	.1205[illegible]	.08677880	[illegible]	.32715707	.9524	.5352
24	.05521780	9.83650E-02	1.84031E-01	.66762911	.11657776	.08817385	.04975584	.32644131	1.0000	.5335

K= 9 PHI = 60.0 Z = 100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03404026	1.01980E-01	1.85674E-01	.62872136	.21441967	.11577167	.04848347	.33046093	0.0000	.5441
4	.03[illegible]	1.01[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	.11571885	[illegible]	.32655784	.0476	.5430
5	.03592620	1.01[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32624511	.0952	.5420
6	.03[illegible]	1.02[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32602365	.1429	.5415
7	.03[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.1905	.5410
8	.03[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.2381	.5402
9	.03[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.2857	.5316
10	.04[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.3333	.5399
11	.04[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.3810	.5381
12	.04[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.4286	.5373
13	.04[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.4762	.5364
14	.04[illegible]	1.0[illegible]E-01	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.5238	.5355
15	.04[illegible]	9.9[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.5714	.5345
16	.04[illegible]	9.9[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.6190	.5334
17	.04[illegible]	9.8[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.6667	.5323
18	.04[illegible]	9.7[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.7143	.5311
19	.04[illegible]	9.7[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.7619	.5299
20	.05[illegible]	9.6[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.8095	.5286
21	.05[illegible]	9.5[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.8571	.5272
22	.05[illegible]	9.4[illegible]E-02	1.8[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.9048	.5258
23	.05[illegible]	9.3[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.9524	.5242
24	.05547823	9.2[illegible]E-02	1.7[illegible]E-01	.47213637	.1237[illegible]	.1014[illegible]	.04[illegible]	.32[illegible]	1.0000	.5226

K=10 PHI = 70.0 Z = 100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03940056	9.[illegible]E-02	1.75270E-01	[illegible]	.2[illegible]	.12[illegible]	.04848347	.32649034	0.0000	.5336
4	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.0476	.5296
5	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.0952	.5284
6	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.1429	.5278
7	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.1905	.5272
8	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.2381	.5267
9	.03[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.2857	.5261
10	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.3333	.5255
11	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.3810	.5248
12	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.4286	.5241
13	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.4762	.5233
14	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.5238	.5225
15	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.5714	.5216
16	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.6190	.5207
17	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.6667	.5197
18	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.7143	.5186
19	.04[illegible]	9.[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32170784	.7619	.5175
20	.05091517	9.0[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32134144	.8095	.5163
21	.05[illegible]	8.9[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.8571	.5150
22	.05[illegible]	8.9[illegible]E-02	1.73[illegible]E-01	[illegible]	[illegible]	.11116[illegible]	[illegible]	.32[illegible]	.9048	.5137
23	.05389569	8.81[illegible]E-02	1.72[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]	.9524	.5122

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
24	.05488520	8.73546E-02	1.71005E-01	.67746230	.13152524	.11049782	.05470467	.31969460	1.0000	.5108

K=11 PHI = 80.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.05404056	8.57621E-02	1.64712E-01	[illegible]	.21874513	.15414183	.00446947	.32264234	0.0000	.5206
4	.05506255	8.62146E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.32179787	.0476	.5155
5	.05612406	8.67391E-02	1.68771E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32063213	.0952	.5140
6	.05716586	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.5135
7	.05821763	[illegible]	1.70012E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.5129
8	.05924940	8.73773E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.32015150	.2381	.5125
9	.06025117	8.74207E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31999151	.2857	.5120
10	.06127294	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.5115
11	.06257471	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.5109
12	.06354648	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4286	.5103
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4762	.5096
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.5089
15	.06614178	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.5081
16	.06714955	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.5073
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.5064
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.5055
19	.05070884	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.5045
20	.05175063	[illegible]	[illegible]	.67777165	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.5035
21	.05279240	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8571	.5025
22	.05385417	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9048	.5011
23	.05487594	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.4998
24	.05591770	[illegible]	[illegible]	[illegible]	.13871731	[illegible]	[illegible]	.31575506	1.0000	.4985

K=12 PHI = 90.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.05404056	7.84441E-02	1.54594E-01	.65095462	.22136975	.14541625	.00446947	.31857806	0.0000	.5075
4	.05513781	7.92753E-02	1.57715E-01	[illegible]	[illegible]	[illegible]	.04419115	.31642132	.0476	.5012
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31610389	.0952	.4996
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31575389	.1429	.4991
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.4986
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31566938	.2381	.4982
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31553597	.2857	.4978
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.4974
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31521934	.3810	.4969
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31509935	.4286	.4964
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31492572	.4762	.4959
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31475419	.5238	.4953
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31452746	.5714	.4946
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.4939
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.4932
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31374832	.7143	.4923
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31351461	.7619	.4915
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.31321630	.8095	.4905
21	.05779112	7.75511E-02	1.58437E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31288201	.8571	.4895
22	[illegible]	7.70371E-02	[illegible]	.65811890	[illegible]	[illegible]	[illegible]	.31254696	.9048	.4884
23	.05566562	7.64018E-02	1.56824E-01	[illegible]	[illegible]	[illegible]	.02198690	.31214268	.9524	.4872
24	.05704268	7.58764E-02	1.56024E-01	.69135403	[illegible]	.11076890	.02159708	[illegible]	1.0000	.4860

K=13 PHI =100.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.05404056	7.18511E-02	1.45197E-01	[illegible]	.22411809	.14652776	.00446947	.31450630	0.0000	.4949
4	.05519792	7.24812E-02	1.48703E-01	[illegible]	[illegible]	.14841768	[illegible]	.31222875	.0476	.4874
5	.05635528	7.29929E-02	1.50331E-01	[illegible]	.21629112	[illegible]	[illegible]	.31161935	.0952	.4855
6	.05751264	7.33057E-02	1.51217E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31146193	.1429	.4851
7	.05867000	7.37065E-02	1.52114E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31130943	.1905	.4845
8	.05982737	7.39334E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.4843
9	.06098473	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.4839

10	.0[illegible]	7.4[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3333	.4834
11	.0[illegible]	7.4[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3810	.4833
12	.0[illegible]	7.4[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4286	.4829
13	.0[illegible]	7.4[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4762	.4825
14	.0[illegible]	7.3[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5238	.4820
15	.0[illegible]	7.3[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5714	.4814
16	.0[illegible]	7.3[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6190	.4808
17	.0[illegible]	7.3[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6667	.4802
18	.0[illegible]	7.2[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7143	.4794
19	.0[illegible]	7.2[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7619	.4787
20	.0[illegible]	7.2[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8095	.4778
21	.0[illegible]	7.1[illegible]E-02	1.5[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8571	.4769
22	.0[illegible]	7.1[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.9048	.4759
23	.0[illegible]	7.0[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.9524	.4747
24	.0[illegible]	7.0[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	1.0000	.4733

K=24 PHI =110.0 Z = .[illegible]

J	R	P	RHO	U	V	W	(S SQRT)/CV	A	T	M/MT
3	.0[illegible]	6.[illegible]E-02	1.3[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	0.0000	.4835
4	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.0476	.4745
5	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.0952	.4723
6	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.1429	.4719
7	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.1905	.4715
8	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.2381	.4713
9	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.2857	.4711
10	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3333	.4709
11	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3810	.4707
12	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4286	.4704
13	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4762	.4700
14	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5238	.4696
15	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5714	.4691
16	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6190	.4686
17	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6667	.4680
18	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7143	.4674
19	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7619	.4666
20	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8095	.4659
21	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8571	.4650
22	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.9048	.4640
23	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.9524	.4629
24	.0[illegible]	6.[illegible]E-02	1.4[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	1.0000	.4619

K=15 PHI =120.0 Z = .[illegible]

J	R	P	RHO	U	V	W	(S SQRT)/CV	A	T	M/MT
3	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	0.0000	.4758
4	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.0476	.4652
5	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.0952	.4608
6	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.1429	.4604
7	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.1905	.4601
8	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.2381	.4600
9	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.2857	.4599
10	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3333	.4597
11	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.3810	.4595
12	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4286	.4592
13	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.4762	.4589
14	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5238	.4585
15	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.5714	.4581
16	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6190	.4576
17	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.6667	.4570
18	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7143	.4564
19	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.7619	.4557
20	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8095	.4549
21	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.8571	.4540
22	.0[illegible]	6.[illegible]E-02	1.[illegible]E-01	.6[illegible]	.1[illegible]	.1[illegible]	.0[illegible]	.3[illegible]	.9048	.4531

23	.05876248	6.07728E-02	1.34485E-01	.71197885	.17289749	.10812510	.00821371	.33063058	.9524	.4519
24	.06108107	6.05492E-02	1.33757E-01	.71544722	.17052268	.10521019	.02308180	.33028195	1.0000	.4528

K=16 PHI =130.0 Z = .100000

J	H	P	RHO	U	V	W	CS SINF J/CV	A	T	H/HT
3	.07434056	5.82508E-02	1.24971E-01	.68142203	.29202150	.12455721	.00843347	.30531542	0.0000	.4661
4	.07114961	[illegible]	1.24831E-01	.68741271	[illegible]	.12517445	.02451402	.30152276	.0476	.4539
5	.05624727	[illegible]	1.30445E-01	.69427474	[illegible]	.12294308	.01782449	.30440524	.0952	.4512
6	.05510063	5.97942E-02	1.31043E-01	.69514694	[illegible]	.12413212	.00450155	.30381367	.1429	.4509
7	.05441500	[illegible]	1.32449E-01	.69751438	[illegible]	.11440737	.01250978	.30229576	.1905	.4507
8	.04858724	5.97516E-02	1.32676E-01	.69847534	[illegible]	.11621281	.00078500	.30108251	.2381	.4526
9	.04216070	[illegible]	1.32464E-01	[illegible]	[illegible]	.11417008	[illegible]	.30015413	.2857	.4505
10	.04553406	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.4503
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.4501
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29444555	.4286	.4498
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29493209	.4762	.4455
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.4491
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29954155	.5714	.4486
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29937058	.6190	.4481
17	[illegible]	[illegible]	[illegible]	.71015753	[illegible]	[illegible]	[illegible]	.29917086	.6667	.4475
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29845040	.7143	.4469
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29808557	.7619	.4461
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29842649	.8095	.4453
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29810012	.8571	.4443
22	[illegible]	[illegible]	[illegible]	.71721173	[illegible]	[illegible]	[illegible]	.29777726	.9048	.4434
23	[illegible]	5.66384E-02	1.28126E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29733988	.9524	.4421
24	.05246105	5.61478E-02	1.27342E-01	.72049346	.17650411	.09589562	.00544150	.29695823	1.0000	.4409

K=17 PHI =140.0 Z = .100000

J	H	P	RHO	U	V	W	CS SINF J/CV	A	T	H/HT
3	.07404056	5.18191E-02	1.21250E-01	[illegible]	.29432478	.10160774	.00840347	.30549137	0.0000	.4605
4	[illegible]	5.61013E-02	1.25770E-01	[illegible]	.23371711	[illegible]	.02115418	.29488749	.0476	.4467
5	[illegible]	5.64673E-02	1.27161E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29707744	.0952	.4440
6	[illegible]	5.66711E-02	1.27756E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29785509	.1429	.4436
7	[illegible]	[illegible]	1.28104E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29780192	.1905	.4434
8	.04111792	[illegible]	1.29869E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29772301	.2381	.4432
9	.04215539	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29769263	.2857	.4431
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00817481	.29766612	.3333	.4428
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29755048	.3810	.4426
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29741969	.4286	.4423
13	[illegible]	[illegible]	1.28137E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29729449	.4762	.4419
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29713330	.5238	.4414
15	[illegible]	[illegible]	1.27574E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29696172	.5714	.4409
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6190	.4403
17	[illegible]	[illegible]	1.26779E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29653030	.6667	.4397
18	[illegible]	[illegible]	[illegible]	.71369271	[illegible]	[illegible]	[illegible]	.29629354	.7143	.4389
19	[illegible]	[illegible]	1.25779E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29600955	.7619	.4381
20	.05810560	[illegible]	1.25141E-01	.72041919	[illegible]	[illegible]	[illegible]	.29571153	.8095	.4372
21	[illegible]	[illegible]	1.24404E-01	.72154279	[illegible]	[illegible]	[illegible]	.29534788	.8571	.4362
22	.06091455	[illegible]	1.23676E-01	.72742695	[illegible]	[illegible]	[illegible]	.29498700	.9048	.4351
23	[illegible]	5.31514E-02	[illegible]	[illegible]	.18410751	[illegible]	.00374803	[illegible]	.9524	.4336
24	[illegible]	5.26544E-02	1.21708E-01	.72651761	[illegible]	[illegible]	[illegible]	.29405630	1.0000	.4323

K=18 PHI =150.0 Z = .100000

J	H	P	RHO	U	V	W	CS SINF J/CV	A	T	H/HT
3	.07404056	5.43326E-02	1.18014E-01	.69137085	.29602464	.08137663	.00840347	.30220918	0.0000	.4569
4	.03151087	5.45156E-02	1.23574E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29703817	.0476	.4412
5	.03698119	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29623206	.0952	.4398
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29609758	.1429	.4384
7	[illegible]	[illegible]	1.25154E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29603466	.1905	.4382
8	.04135213	[illegible]	1.25242E-01	.71041375	[illegible]	[illegible]	[illegible]	.29594178	.2381	.4379

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9	.04286245	5.48124E-02	1.25224E-01	.71182446	.22275318	.0772[illegible]700	.00486900	.29587622	.2857	.4377
10	.04433276	5.47423E-02	1.25156E-01	.71300104	.2202[illegible]471	.07571945	.00435401	.29576773	.3333	.4374
11	.04580307	5.463[illegible]E-02	1.2499[illegible]E-01	.71411494	.21776[illegible]	.0743[illegible]	.00416190	.29566090	.3810	.4371
12	.04727339	5.4487[illegible]E-02	1.24765E-01	.71527786	.21558788	.07303449	.00385093	.29551782	.4286	.4367
13	.04874370	5.43106E-02	1.2450[illegible]E-01	.71642450	.21302116	.07187659	.00365237	.29536360	.4762	.4362
14	.05021402	5.41[illegible]E-02	1.2418[illegible]E-01	.71775710	.21[illegible]8	.07[illegible]318	.00348515	.29518036	.5238	.4357
15	.05168433	5.38[illegible]E-02	1.23[illegible]E-01	.718[illegible]455	.2[illegible]35	.0[illegible]42	[illegible]	.29497905	.5714	.4351
16	.05315465	5.35[illegible]E-02	1.23374E-01	.72033518	.20[illegible]3	.06657812	.003[illegible]0194	.29475092	.6190	.4344
17	.05462496	5.32844E-02	1.22877E-01	.72150736	.20371[illegible]30	.06[illegible]1	.003[illegible]52	.29449617	.6667	.4336
18	.05609528	5.2950[illegible]E-02	1.22336E-01	.72200742	.20138[illegible]6	.0667[illegible]4	.00277451	.29421952	.7143	.4328
19	.05756559	5.25527E-02	1.21704E-01	.72400444	.1[illegible]83	.06549[illegible]01	.00287957	.29390117	.7619	.4319
20	.05903591	5.21570E-02	1.2104[illegible]E-01	.72541341	.19654770	.06510265	.00278792	.29356639	.8095	.4309
21	.06050622	5.16614E-02	1.20224E-01	.72701369	.19390[illegible]29	.0643[illegible]42	.00271072	.29315820	.8571	.4297
22	.06197654	5.11711E-02	1.19415E-01	.72857621	.19133[illegible]76	.06364752	.00263161	.29275081	.9048	.4285
23	.06344685	5.0495[illegible]E-02	1.18288E-01	.73057767	.18919[illegible]0	.06301180	.002[illegible]6	.29218730	.9524	.4269
24	.06491717	4.[illegible]977E-02	1.17296E-01	.73235920	.18537532	.06234736	.002[illegible]7	.29168485	1.0000	.4254

K=19 PHI =160.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404056	5.34476E-02	1.17527E-01	.69714538	.23731152	.05385252	.06846347	.30158487	0.0000	.4548
4	.03555365	5.3520[illegible]E-02	1.22434E-01	.70905[illegible]40	.23[illegible]290	.05787170	.01272592	.29570505	.0476	.4372
5	.03706674	5.35725E-02	1.23047E-01	.71111533	.23[illegible]3465	.05838611	.00651500	.29508723	.0952	.4354
6	.03857983	5.3594[illegible]E-02	1.2318[illegible]E-01	.712[illegible]34	.23[illegible]49	.05677479	.00[illegible]953	.29498253	.1429	.4351
7	.04009292	5.3[illegible]E-02	1.23[illegible]E-01	.713[illegible]72	.23[illegible]57	.05[illegible]40	.00418362	.29487282	.1905	.4347
8	.04160[illegible]02	5.35057E-02	1.23153E-01	.714[illegible]49	.22745769	.05[illegible]19	.00[illegible]427	.29477653	.2381	.4345
9	.04311911	5.34[illegible]E-02	1.23[illegible]E-01	.71561614	.22557243	.0535[illegible]2	.00378124	.29466740	.2857	.4341
10	.04463220	5.32638E-02	1.2284[illegible]E-01	.71672182	.22319512	.05[illegible]8132	.00345582	.29453423	.3333	.4338
11	.04614529	5.31271E-02	1.2260[illegible]E-01	.71781138	.22[illegible]29	.05141882	.003[illegible]62	.29438844	.3810	.4333
12	.04765839	5.29415E-02	1.22318E-01	.71893181	.21855[illegible]86	.05044643	.003[illegible]1842	.29421739	.4286	.4328
13	.04917148	5.2727[illegible]E-02	1.21978E-01	.720[illegible]783	.21627[illegible]87	.04959[illegible]40	.002[illegible]6140	.29403048	.4762	.4323
14	.05068457	5.2484[illegible]E-02	1.21591E-01	.721[illegible]75	.21399[illegible]7	.04876451	.002[illegible]9621	.29381945	.5238	.4316
15	.05219766	5.22119E-02	1.2115[illegible]E-01	.722[illegible]2738	.21172102	.04[illegible]1159	.002[illegible]6800	.29356739	.5714	.4310
16	.05371075	5.19115E-02	1.20[illegible]E-01	.72[illegible]29	.20[illegible]254	.04[illegible]65	.00[illegible]327	.29333249	.6190	.4302
17	.055[illegible]385	5.1574[illegible]E-02	1.20111E-01	.72[illegible]89	.20712117	.04[illegible]27	.002[illegible]805	.29304854	.6667	.4294
18	.0567[illegible]94	5.12113E-02	1.19515E-01	.72[illegible]07	.204[illegible]917	.04[illegible]17	.00[illegible]43	.29274269	.7143	.4285
19	.05825003	5.07[illegible]E-02	1.18828E-01	.727[illegible]02	.2027[illegible]43	.04[illegible]52	.00215322	.29239239	.7619	.4275
20	.05976312	5.03[illegible]3E-02	1.18104E-01	.72[illegible]1	.19[illegible]633	.04416[illegible]90	.00207132	.29202355	.8095	.4264
21	.06127621	4.98284E-02	1.17221E-01	.73050060	.19718737	.04434[illegible]95	.00200156	.29157528	.8571	.4251
22	.06278931	4.92989E-02	1.16336E-01	.73244302	.19452091	.04385205	.00192941	.29112317	.9048	.4238
23	.06430240	4.85646E-02	1.15100E-01	.73458955	.19120[illegible]2	.04341831	.00187556	.290[illegible]410	.9524	.4219
24	.06581549	4.79135E-02	1.14001E-01	.73650994	.18819918	.04295893	.00180464	.28992713	1.0000	.4203

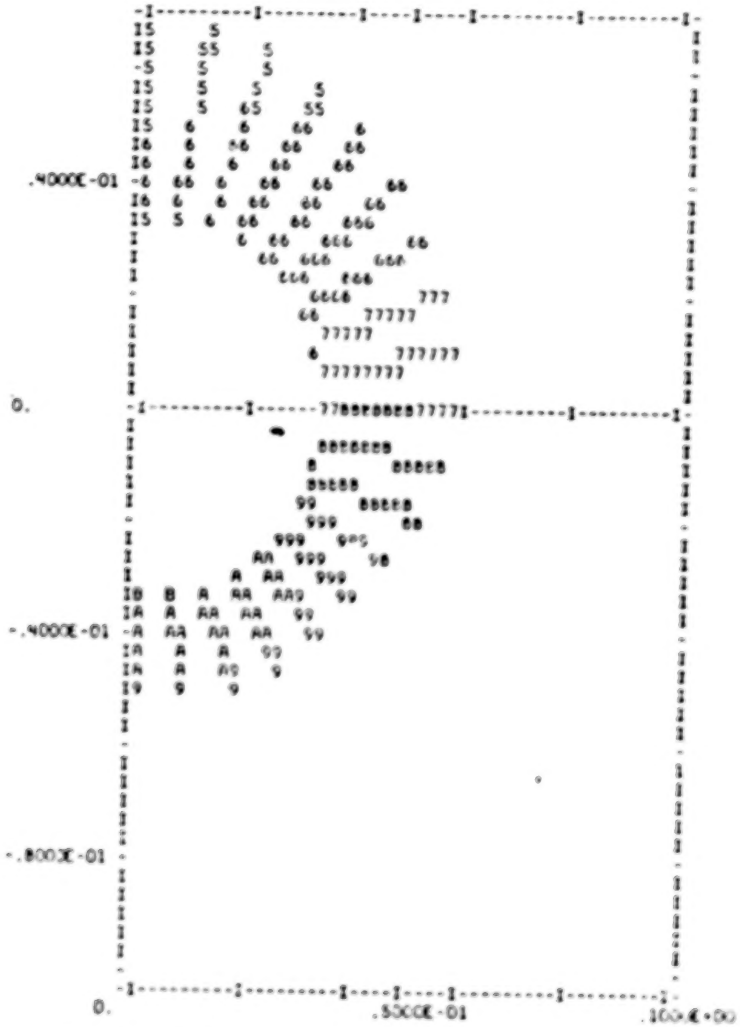
K=20 PHI =170.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404056	5.30018E-02	1.16826E-01	.69925885	.238[illegible]3045	.02642[illegible]56	.06846347	.30122418	0.0000	.4537
4	.03558110	5.30466E-02	1.21974E-01	.71216010	.23887852	.02941523	.00693842	.29492365	.0476	.4349
5	.03712165	5.2985[illegible]E-02	1.22193E-01	.71374653	.23672077	.03010[illegible]89	.00528095	.29449038	.0952	.4336
6	.03866219	5.29434E-02	1.22196E-01	.71485078	.23[illegible]256	.029[illegible]60	.00444294	.29436859	.1429	.4333
7	.04020274	5.28651E-02	1.22126E-01	.71597874	.23192517	.02874997	.00376999	.29423567	.1905	.4329
8	.04174329	5.27513E-02	1.21955E-01	.71691574	.22[illegible]0	.027[illegible]25	.00353056	.29411998	.2381	.4325
9	.04328383	5.2[illegible]E-02	1.21767E-01	.717[illegible]25	.22[illegible]2	.027[illegible]55	.003[illegible]073	.29399049	.2857	.4322
10	.04482438	5.2455[illegible]E-02	1.215[illegible]E-01	.719[illegible]35	.22[illegible]148	.02[illegible]0	.00[illegible]578	.29383675	.3333	.4317
11	.0463[illegible]493	5.227[illegible]E-02	1.212[illegible]E-01	.720[illegible]72	.22[illegible]8658	.02[illegible]6	.00[illegible]3230	.29366758	.3810	.4312
12	.047[illegible]47	5.2054[illegible]E-02	1.20[illegible]4E-01	.7211[illegible]42	.22[illegible]66	.02[illegible]72	.00263652	.29346827	.4286	.4306
13	.049[illegible]02	5.1816[illegible]E-02	1.20[illegible]E-01	.72[illegible]69	.218[illegible]0	.025[illegible]8	.002[illegible]99	.29325619	.4762	.4300
14	.05098[illegible]56	5.15504E-02	1.20075E-01	.72343629	.21610[illegible]2	.02453462	.00230035	.29302514	.5238	.4293
15	.05252711	5.1256[illegible]E-02	1.19598E-01	.724[illegible]93	.213[illegible]3	.02[illegible]4	.00216220	.29277178	.5714	.4286
16	.05406766	5.09371E-02	1.19074E-01	.72585376	.211[illegible]74	.024[illegible]21	.00[illegible]5147	.29249858	.6190	.4278
17	.05560820	5.0[illegible]E-02	1.184[illegible]E-01	.72714[illegible]0	.2092[illegible]52	.02[illegible]50	.00194623	.29219386	.6667	.4269
18	.05714875	5.0201[illegible]E-02	1.178[illegible]E-01	.728[illegible]	.20[illegible]2	.02[illegible]21	.00185611	.29187078	.7143	.4259
19	.05868930	4.97633E-02	1.17131E-01	.72[illegible]91	.20[illegible]40	.02[illegible]65	.00177546	.29149735	.7619	.4249
20	.06022984	4.931[illegible]E-02	1.16377E-01	.73178607	.20[illegible]3	.02[illegible]9	.00169493	.29111019	.8095	.4237
21	.06177039	4.875[illegible]E-02	1.1544[illegible]E-01	.73309546	.19[illegible]8	.0220[illegible]7	.00163562	.29063414	.8571	.4223

22	.06331093	4.82052E-02	1.14516E-01	.73479557	.19657570	.02238877	.00156734	.29015406	.9048	.4209
23	.06485148	4.74366E-02	1.13213E-01	.73702228	.19315690	.02217199	.00151921	.28948365	.9524	.4190
24	.06639203	4.67370E-02	1.12023E-01	.73906799	.18996998	.02193724	.00145106	.28886283	1.0000	.4172

K-21 PHI =180.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03404056	5.28402E-02	1.16572E-01	.69995947	.23826945	0.00000000	.06846347	.30109281	0.0000	.4533
4	.03558996	5.28574E-02	1.21805E-01	.71319961	.23005515	0.00000000	.00787640	.29463527	.0476	.4342
5	.03713936	5.27904E-02	1.21879E-01	.71461269	.23304539	0.00000000	.00519157	.29432567	.0952	.4331
6	.03868876	5.27224E-02	1.21849E-01	.71572087	.23461350	0.00000000	.00434770	.29417212	.1429	.4327
7	.04023816	5.26594E-02	1.21743E-01	.71673656	.23597450	0.00000000	.00368094	.29403772	.1905	.4323
8	.04178757	5.24923E-02	1.21539E-01	.71774019	.23911669	0.00000000	.00349423	.29390313	.2381	.4319
9	.04333697	5.23518E-02	1.21324E-01	.71873714	.22789487	0.00000000	.00323683	.29376985	.2857	.4315
10	.04488637	5.21694E-02	1.21036E-01	.71977052	.24563093	0.00000000	.00306841	.29360564	.3333	.4310
11	.04643577	5.19756E-02	1.20775E-01	.72084068	.25540086	0.00000000	.00279933	.29342149	.3810	.4305
12	.04798517	5.17481E-02	1.20378E-01	.72193798	.22119961	0.00000000	.00259942	.29321636	.4286	.4299
13	.04953458	5.15020E-02	1.19988E-01	.72306199	.21848767	0.00000000	.00247568	.29299377	.4762	.4292
14	.05108398	5.12367E-02	1.19543E-01	.72421378	.21677363	0.00000000	.00222668	.29275394	.5238	.4285
15	.05263338	5.09262E-02	1.19054E-01	.72540028	.21454063	0.00000000	.00203481	.29249211	.5714	.4278
16	.05418278	5.05694E-02	1.18517E-01	.72663121	.21227118	0.00000000	.00198328	.29221160	.6190	.4269
17	.05573218	5.02354E-02	1.17917E-01	.72791135	.20998170	0.00000000	.00184960	.29189550	.6667	.4260
18	.05728159	4.98519E-02	1.17281E-01	.72924406	.20768453	0.00000000	.00175755	.29156956	.7143	.4251
19	.05883099	4.94035E-02	1.16537E-01	.73061835	.20518940	0.00000000	.00167327	.29118618	.7619	.4239
20	.06038039	4.89119E-02	1.15738E-01	.73218092	.20274019	0.00000000	.00159430	.29079467	.8095	.4228
21	.06192979	4.83873E-02	1.14828E-01	.73361410	.19695237	0.00000000	.00152962	.29030035	.8571	.4214
22	.06347919	4.78278E-02	1.13487E-01	.73561219	.19725006	0.00000000	.00145799	.28981889	.9048	.4200
23	.06502860	4.70485E-02	1.12559E-01	.73788403	.19374787	0.00000000	.00140978	.28913282	.9524	.4180
24	.06657800	4.63281E-02	1.11331E-01	.73998590	.19050454	0.00000000	.00133808	.28848878	1.0000	.4161



VERTICAL SCALING

0.	0	.200E-01	.200E-01	1	.400E-01
.400E-01	2	.600E-01	.600E-01	3	.800E-01
.800E-01	4	.100E+00	.100E+00	5	.120
.120	6	.140	.140	7	.160
.160	8	.180	.180	9	.200
.200	A	.220	.220	B	.240
.240	C	.260	.260	D	.280
.280	E	.300	.300	F	.320
.320	G	.340	.340	H	.360
.360	I	.380			

SURFACE FLOW VARIABLES AT Z = 1000.00

X/L = .001000 DZDT= 1.199208 ITER= 500

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	.0340	.5054	3.8655E+00	2.5016E+00	1.7764	.6254	0.0000	3.4241E-01	1.0000	.5862	.00	6.8463E-02
10.0	.0340	.4954	3.8566E+00	2.4886E+00	1.7820	.6266	.0216	3.4205E-01	1.0000	.5849	.00	6.8463E-02
20.0	.0340	.4809	3.7535E+00	2.4996E+00	1.7925	.6282	.1227	3.4094E-01	1.0000	.5813	.00	6.8463E-02
30.0	.0340	.4576	3.6370E+00	2.3873E+00	1.8103	.6282	.1823	3.4034E-01	1.0000	.5753	.00	6.8463E-02
40.0	.0340	.4232	3.4960E+00	2.2500E+00	1.8347	.6245	.2395	3.3984E-01	1.0000	.5673	.00	6.8463E-02
50.0	.0340	.3915	3.3405E+00	2.2057E+00	1.8656	.6350	.2936	3.3918E-01	1.0000	.5574	.00	6.8463E-02
60.0	.0340	.3519	3.0349E+00	2.0000E+00	1.9025	.6436	.3451	3.3847E-01	1.0000	.5460	.00	6.8463E-02
70.0	.0340	.3110	2.7918E+00	1.9278E+00	1.9448	.6620	.3930	3.3788E-01	1.0000	.5330	.00	6.8463E-02
80.0	.0340	.2707	2.5128E+00	1.8571E+00	1.9916	.6719	.4379	3.3729E-01	1.0000	.5205	.00	6.8463E-02
90.0	.0340	.2367	2.3544E+00	1.7974E+00	2.0414	.6869	.4802	3.3695E-01	1.0000	.5074	.00	6.8463E-02
100.0	.0340	.2085	2.2134E+00	1.7451E+00	2.0937	.7029	.4651	3.3681E-01	1.0000	.4989	.00	6.8463E-02
110.0	.0340	.1892	1.9228E+00	1.5446E+00	2.1434	.7266	.4963	3.3703E-01	1.0000	.4834	.00	6.8463E-02
120.0	.0340	.1918	1.8536E+00	1.4695E+00	2.1907	.7457	.4957	3.3781E-01	1.0000	.4737	.00	6.8463E-02
130.0	.0340	.1276	1.7521E+00	1.4040E+00	2.2325	.7600	.4973	3.3915E-01	1.0000	.4660	.00	6.8463E-02
140.0	.0340	.1154	1.6609E+00	1.3692E+00	2.2672	.7718	.5480	3.3943E-01	1.0000	.4609	.00	6.8463E-02
150.0	.0340	.1075	1.6174E+00	1.3414E+00	2.2957	.7826	.2492	3.3972E-01	1.0000	.4569	.00	6.8463E-02
160.0	.0340	.1029	1.5914E+00	1.3268E+00	2.3116	.7869	.1787	3.4015E-01	1.0000	.4547	.00	6.8463E-02
170.0	.0340	.1006	1.5760E+00	1.3179E+00	2.3214	.7902	.0977	3.4123E-01	1.0000	.4536	.00	6.8463E-02
180.0	.0340	.0988	1.5712E+00	1.3150E+00	2.3247	.7913	0.0000	3.4160E-01	1.0000	.4532	.00	6.8463E-02

BODY AND SHOCK GEOMETRY AT Z = .100

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	.0340	.3404	0.0000	.0515	.5150	0.0000
10.0	.0340	.3404	0.0000	.0516	.5156	.0018
20.0	.0340	.3404	0.0000	.0519	.5176	.0036
30.0	.0340	.3404	0.0000	.0521	.5210	.0054
40.0	.0340	.3404	0.0000	.0526	.5258	.0072
50.0	.0340	.3404	0.0000	.0532	.5321	.0090
60.0	.0340	.3404	0.0000	.0540	.5397	.0107
70.0	.0340	.3404	0.0000	.0549	.5487	.0125
80.0	.0340	.3404	0.0000	.0559	.5591	.0143
90.0	.0340	.3404	0.0000	.0571	.5708	.0161
100.0	.0340	.3404	0.0000	.0583	.5839	.0179
110.0	.0340	.3404	0.0000	.0597	.5983	.0198
120.0	.0340	.3404	0.0000	.0611	.6139	.0216
130.0	.0340	.3404	0.0000	.0626	.6307	.0234
140.0	.0340	.3404	0.0000	.0642	.6487	.0252
150.0	.0340	.3404	0.0000	.0659	.6679	.0270
160.0	.0340	.3404	0.0000	.0677	.6883	.0288
170.0	.0340	.3404	0.0000	.0696	.7098	.0306
180.0	.0340	.3404	0.0000	.0716	.7324	.0324

FLOW FIELD DATA IS STORED ON DISK1

```
NSEG,KIND     3     0     1     1     0     0     0     0
ZSEG      .10000   7.80000  33.65000
RSEG      .03405   1.80000   1.30059
DSEG   0.60000   0.05000   0.66200
RSEG   0.00000   0.05000   0.06440

SEGMENT  1  ZCENT,RCENT,RADIUS   7.80000 -22.75000  24.05000
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```
MACH =  2.860000
ALPHA = 10.000000
GAMMA = 1.400
SIGMA =  9.34

Z-INITIAL =      .10
Z-FINAL =      33.80
PHI-ZERO =  90.00

NIT = 20
NIPHI = 18
METHOD ORDER = 2
NITER = 9999
NPRNT = 0
IPRNT = 1
NCONE = 2
NWPRT= 0
NREAL = 0

DZ/DT =  1.199 INITIALLY
DELTA-X =    .150
DELTA-Y =    .400

DISK1 = 1
DISK2 = 3
TAPE1 = 1
TAPE2 = 1

PERCENT OF MAX. STEPSIZE =  .90
METHOD = 2
BND. COND. = 1
BETA=0.000
OMEGA= 0.000

PINF =      .3363C8E-01     RHOIN =      .8864B1E-01     QINF =      .787798E+00

CASCON= 1.716CE+03

K =  3     PHI=  0.000000     UINF=  .775830     VINF=  -.156830     WINF=  0.000000
K =  4     PHI= 10.000000     UINF=  .775830     VINF=  -.134721     WINF=   .023755
K =  5     PHI= 20.000000     UINF=  .775830     VINF=  -.128550     WINF=   .048788
K =  6     PHI= 30.000000     UINF=  .775830     VINF=  -.111972     WINF=   .068400
K =  7     PHI= 40.000000     UINF=  .775830     VINF=  -.087435     WINF=   .087433
K =  8     PHI= 50.000000     UINF=  .775830     VINF=  -.059793     WINF=   .104795
K =  9     PHI= 60.000000     UINF=  .775830     VINF=  -.029798     WINF=   .118472
K = 10     PHI= 70.000000     UINF=  .775830     VINF=  -.000000     WINF=   .128550
K = 11     PHI= 80.000000     UINF=  .775830     VINF=  -.023755     WINF=   .134721
K = 12     PHI= 90.000000     UINF=  .775830     VINF=  -.000000     WINF=   .136830
K = 13     PHI=100.000000     UINF=  .775830     VINF=   .023755     WINF=   .134721
K = 14     PHI=110.000000     UINF=  .775830     VINF=   .048788     WINF=   .128550
K = 15     PHI=120.000000     UINF=  .775830     VINF=   .068400     WINF=   .118472
K = 16     PHI=130.000000     UINF=  .775830     VINF=   .087433     WINF=   .104795
K = 17     PHI=140.000000     UINF=  .775830     VINF=   .104795     WINF=   .087433
K = 18     PHI=150.000000     UINF=  .775830     VINF=   .118472     WINF=   .068400
K = 19     PHI=160.000000     UINF=  .775830     VINF=   .128550     WINF=   .048788
K = 20     PHI=170.000000     UINF=  .775830     VINF=   .134721     WINF=   .023755
K = 21     PHI=180.000000     UINF=  .775830     VINF=   .136830     WINF=   .000000
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RADIAL MESH DESCRIPTION

J= 3	TAU= 0.	XI = 0.	TXI = .1000E-01	TXIT = 0.
J= 4	TAU= .4762E-01	XI = .4762E-01	TXI = .1000E+01	TXIT = 0.
J= 5	TAU= .9524E-01	XI = .9524E-01	TXI = .1000E+01	TXIT = 0.
J= 6	TAU= .1429E+00	XI = .1429E+00	TXI = .1000E+01	TXIT = 0.
J= 7	TAU= .1905E+00	XI = .1905E+00	TXI = .1000E+01	TXIT = 0.
J= 8	TAU= .2381E+00	XI = .2381E+00	TXI = .1000E+01	TXIT = 0.
J= 9	TAU= .2857E+00	XI = .2857E+00	TXI = .1000E+01	TXIT = 0.
J=10	TAU= .3333E+00	XI = .3333E+00	TXI = .1000E+01	TXIT = 0.
J=11	TAU= .3810E+00	XI = .3810E+00	TXI = .1000E+01	TXIT = 0.
J=12	TAU= .4286E+00	XI = .4286E+00	TXI = .1000E+01	TXIT = 0.
J=13	TAU= .4762E+00	XI = .4762E+00	TXI = .1000E+01	TXIT = 0.
J=14	TAU= .5238E+00	XI = .5238E+00	TXI = .1000E+01	TXIT = 0.
J=15	TAU= .5714E+00	XI = .5714E+00	TXI = .1000E+01	TXIT = 0.
J=16	TAU= .6190E+00	XI = .6190E+00	TXI = .1000E+01	TXIT = 0.
J=17	TAU= .6667E+00	XI = .6667E+00	TXI = .1000E+01	TXIT = 0.
J=18	TAU= .7143E+00	XI = .7143E+00	TXI = .1000E+01	TXIT = 0.
J=19	TAU= .7619E+00	XI = .7619E+00	TXI = .1000E+01	TXIT = 0.
J=20	TAU= .8095E+00	XI = .8095E+00	TXI = .1000E+01	TXIT = 0.
J=21	TAU= .8571E+00	XI = .8571E+00	TXI = .1000E+01	TXIT = 0.
J=22	TAU= .9048E+00	XI = .9048E+00	TXI = .1000E+01	TXIT = 0.
J=23	TAU= .9524E+00	XI = .9524E+00	TXI = .1000E+01	TXIT = 0.
J=24	TAU= .1000E+01	XI = .1000E+01	TXI = .1000E+01	TXIT = 0.

MERIDIANOL MESH DESCRIPTION

K	ETA	PHI	DTIL	DTILE
K= 2	ETA= -.1745E+00	PHI= -.1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 3	ETA= 0.	PHI= 0.	DTIL= .1000E+01	DTILE= 0
K= 4	ETA= .1745E+00	PHI= .1745E+00	DTIL= .1000E+01	DTILE= 0.
K= 5	ETA= .3491E+00	PHI= .3491E+00	DTIL= .1000E+01	DTILE= 0.
K= 6	ETA= .5236E+00	PHI= .5236E+00	DTIL= .1000E+01	DTILE= 0.
K= 7	ETA= .6981E+00	PHI= .6981E+00	DTIL= .1000E+01	DTILE= 0.
K= 8	ETA= .8727E+00	PHI= .8727E+00	DTIL= .1000E+01	DTILE= 0.
K= 9	ETA= .1047E+01	PHI= .1047E+01	DTIL= .1000E+01	DTILE= 0.
K=10	ETA= .1222E+01	PHI= .1222E+01	DTIL= .1000E+01	DTILE= 0.
K=11	ETA= .1396E+01	PHI= .1396E+01	DTIL= .1000E+01	DTILE= 0.
K=12	ETA= .1571E+01	PHI= .1571E+01	DTIL= .1000E+01	DTILE= 0.
K=13	ETA= .1745E+01	PHI= .1745E+01	DTIL= .1000E+01	DTILE= 0.
K=14	ETA= .1920E+01	PHI= .1920E+01	DTIL= .1000E+01	DTILE= 0.
K=15	ETA= .2094E+01	PHI= .2094E+01	DTIL= .1000E+01	DTILE= 0.
K=16	ETA= .2269E+01	PHI= .2269E+01	DTIL= .1000E+01	DTILE= 0.
K=17	ETA= .2443E+01	PHI= .2443E+01	DTIL= .1000E+01	DTILE= 0.
K=18	ETA= .2618E+01	PHI= .2618E+01	DTIL= .1000E+01	DTILE= 0.
K=19	ETA= .2793E+01	PHI= .2793E+01	DTIL= .1000E+01	DTILE= 0.
K=20	ETA= .2967E+01	PHI= .2967E+01	DTIL= .1000E+01	DTILE= 0.
K=21	ETA= .3142E+01	PHI= .3142E+01	DTIL= .1000E+01	DTILE= 0.
K=22	ETA= .3316E+01	PHI= -.2967E+01	DTIL= .1000E+01	DTILE= 0.

FLOW FIELD DATA WAS READ FROM DISK1

K= 3 PHI = 0.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	1.29582E-01	2.21729E-01	.60794191	.20728665	0.00000000	.06846347	.34240969	0.0000	.5862
4	.03487203	1.29931E-01	2.21667E-01	.61135050	.20024083	0.00000000	.06845970	.34238989	.0476	.5862
5	.03570360	1.29730E-01	2.21422E-01	.61370994	.19751726	0.00000000	.06845970	.34231439	.0952	.5859
6	.03653517	1.29417E-01	2.21045E-01	.61601464	.18717663	0.00000000	.06845970	.34219610	.1429	.5855
7	.03736674	1.29002E-01	2.20533E-01	.61827195	.18106950	0.00000000	.06845970	.34203907	.1905	.5850
8	.03819831	1.28490E-01	2.19915E-01	.62048809	.17520594	0.00000000	.06845970	.34184716	.2381	.5843
9	.03902987	1.27908E-01	2.19197E-01	.62266898	.16971016	0.00000000	.06845970	.34162542	.2857	.5835
10	.03986144	1.27244E-01	2.18384E-01	.62481984	.16418426	0.00000000	.06845970	.34137027	.3333	.5827
11	.04069301	1.26516E-01	2.17448E-01	.62694613	.15887209	0.00000000	.06845970	.34108970	.3810	.5817
12	.04152458	1.25725E-01	2.16514E-01	.62905276	.15370465	0.00000000	.06845970	.34078321	.4286	.5807
13	.04235614	1.24870E-01	2.15464E-01	.63114451	.14872423	0.00000000	.06845970	.34045197	.4762	.5795
14	.04318771	1.23961E-01	2.14343E-01	.63322618	.14361738	0.00000000	.06845970	.34009677	.5238	.5783
15	.04401928	1.22998E-01	2.13152E-01	.63530259	.13929443	0.00000000	.06845970	.33971811	.5714	.5770
16	.04485085	1.21987E-01	2.11894E-01	.63737660	.13447342	0.00000000	.06845970	.33931615	.6190	.5757
17	.04568242	1.20916E-01	2.10565E-01	.63945965	.12983456	0.00000000	.06845970	.33889066	.6667	.5742
18	.04651398	1.19798E-01	2.09177E-01	.64155037	.12550052	0.00000000	.06845970	.33844139	.7143	.5727
19	.04734555	1.18627E-01	2.07714E-01	.64365939	.12081310	0.00000000	.06845970	.33796672	.7619	.5711
20	.04817712	1.17400E-01	2.06184E-01	.64578613	.11637569	0.00000000	.06845970	.33746752	.8095	.5694
21	.04900869	1.16118E-01	2.04560E-01	.64795738	.11186442	0.00000000	.06845970	.33693619	.8571	.5676
22	.04984025	1.14795E-01	2.02897E-01	.65013366	.10747701	0.00000000	.06845970	.33638517	.9048	.5658
23	.05067182	1.13746E-01	2.01066E-01	.65244193	.10193954	0.00000000	.06845970	.33577517	.9524	.5637
24	.05150339	1.11961E-01	1.99306E-01	.65462775	.09956234	0.00000000	.06845970	.33518591	1.0000	.5617

K= 4 PHI = 10.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	1.29025E-01	2.20561E-01	.60952474	.20748505	.02106710	.06846347	.34204821	0.0000	.5850
4	.03487530	1.28985E-01	2.20490E-01	.61185377	.20043479	.02122411	.06863551	.34205567	.0476	.5850
5	.03571014	1.28804E-01	2.20287E-01	.61423797	.19378419	.02112[illegible]	.06849670	.34196877	.0952	.5847
6	.03654497	1.28507E-01	2.19930E-01	.61654791	.18743174	[illegible]	.06841787	.34184625	.1429	.5843
7	.03737980	1.28108E-01	2.19471E-01	.61883683	.18135573	[illegible]	[illegible]	.34167620	.1905	.5837
8	.03821464	1.27619E-01	2.18879E-01	.62105155	[illegible]	.02078728	.06821984	.34148744	.2381	.5831
9	.03904947	1.27047E-01	2.18195E-01	.62324799	[illegible]	[illegible]	.06811724	.34125213	.2857	.5823
10	.03988431	1.26402E-01	2.17410E-01	.62539761	.16440418	[illegible]	[illegible]	.34099804	.3333	.5914
11	.04071914	1.25688E-01	2.16543E-01	.62752972	.15923042	[illegible]	.06799972	.34071369	.3810	.5804
12	.04155398	1.24910E-01	2.15592E-01	.62963485	.15414155	[illegible]	.06795338	.34040625	.4286	.5794

13	.04238881	1.24074E-01	2.14556E-01	.63172672	.14418455	.02034975	.06760232	.34007341	.4762	.5782
14	.04322364	1.23181E-01	2.13471E-01	.63[illegible]572	.144[illegible]90	.02[illegible]3573	.06781969	.33971770	.5238	.5770
15	.04401848	1.22235E-01	2.12304E-01	.63187849	.13[illegible]	.02[illegible]186	.06[illegible]1879	.33935869	.5714	.5758
16	.04481331	1.21237E-01	2.11073E-01	.63795749	.13497325	.02[illegible]	.06778156	.33893683	.6190	.5744
17	.04572815	1.20187E-01	2.09765E-01	.64022650	.13[illegible]27	.02[illegible]73	.06774708	.33851180	.6667	.5730
18	.04656298	1.19082E-01	2.08352E-01	.64211131	.12[illegible]67	.02[illegible]304	.06771462	.33806327	.7143	.5714
19	.04739782	1.17932E-01	2.06956E-01	.64421335	.12149478	.0202[illegible]44	.06768490	.33758975	.7619	.5698
20	.04823265	1.16728E-01	2.05451E-01	.64635238	.11701[illegible]93	.02019[illegible]01	.06765607	.33709178	.8095	.5682
21	.04906748	1.15455E-01	2.03857E-01	.64849489	.1125[illegible]46	.02019188	.06763044	.33656250	.8571	.5664
22	.04990232	1.14152E-01	2.02210E-01	.65066498	.10819125	.0201[illegible]818	.06760941	.33601255	.9048	.5645
23	.05073715	1.12725E-01	2.00404E-01	.65291696	.1038[illegible]70	.020[illegible]198	.06758493	.33540704	.9524	.5625
24	.05157199	1.11346E-01	1.98656E-01	.65514775	.0995[illegible]3	.02022248	.06755256	.33481527	1.0000	.5605

K= 5 PHI = 20.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	1.26225E-01	2.17131E-01	.61124959	.20807219	.04184351	.06846347	.34097772	0.0000	.5813
4	.03489197	1.26234E-01	2.17242E-01	.61375704	.20114519	.0420[illegible]871	.06782304	.34090336	.0476	.5811
5	.03572948	1.26035E-01	2.17144E-01	.61618790	.19458183	.041[illegible]759	.06735292	.34076221	.0952	.5807
6	.03657399	1.25847E-01	2.16873E-01	.61850723	.188[illegible]95	.0416[illegible]97	.067[illegible]7	.34066310	.1429	.5803
7	.03741849	1.25490E-01	2.16492E-01	.62075925	.182[illegible]36	.0413[illegible]16	.06677015	.34049772	.1905	.5797
8	.03826300	1.25047E-01	2.15570E-01	.62300470	.1763[illegible]40	.0411[illegible]91	.0665[illegible]33	.34029440	.2381	.5790
9	.03910750	1.24577E-01	2.15316E-01	.62519212	.17130[illegible]84	.0409[illegible]525	.06637252	.34006268	.2857	.5782
10	.03995201	1.23922E-01	2.14637E-01	.62732589	.1656[illegible]83	.0407[illegible]534	.06622785	.33981075	.3333	.5774
11	.04079652	1.23255E-01	2.13835E-01	.62944160	.1604[illegible]61	.0406[illegible]58	.06606333	.33952867	.3810	.5764
12	.04164102	1.22524E-01	2.12944E-01	.63152033	.1554[illegible]39	.0404[illegible]43	.06593642	.33922499	.4286	.5754
13	.04248553	1.21794E-01	2.11987E-01	.63359679	.150[illegible]50	.0403174[illegible]	.0658[illegible]19	.33889624	.4762	.5743
14	.04333003	1.20889E-01	2.10951E-01	.63551201	.14[illegible]04	.04017[illegible]66	.06566493	.33854550	.5238	.5731
15	.04417454	1.19983E-01	2.09845E-01	.63770[illegible]23	.14117121	.040[illegible]20	.06554128	.33817192	.5714	.5718
16	.04501905	1.19039E-01	2.08670E-01	.63974530	.136[illegible]87	.04001261	.06544417	.33777611	.6190	.5705
17	.04586355	1.18037E-01	2.07429E-01	.64179517	.13211[illegible]22	.03[illegible]37	.065[illegible]66	.33725765	.6667	.5691
18	.04670806	1.16965E-01	2.06118E-01	.64[illegible]874	.12769171	.03984455	.06531960	.33691621	.7143	.5676
19	.04755257	1.15893E-01	2.04737E-01	.64[illegible]030	.12330370	.039[illegible]613	.06525938	.33645029	.7619	.5660
20	.04839707	1.14726E-01	2.05294E-01	.648[illegible]830	.11896[illegible]58	.03981923	.06516336	.33596044	.8095	.5643
21	.04924158	1.13507E-01	2.01755E-01	.65013698	.11461950	.0398[illegible]82	.06509439	.33543992	.8571	.5626
22	.05008608	1.12251E-01	2.00167E-01	.65227411	.1103[illegible]20	.039[illegible]720	.06502547	.33489885	.9048	.5608
23	.05093059	1.10880E-01	1.98420E-01	.65452689	.105[illegible]82	.039[illegible]75	.06496686	.33430430	.9524	.5588
24	.05177510	1.09549E-01	1.[illegible]4731E-01	.65669121	.10160[illegible]11	.03985007	.06489772	.33371983	1.0000	.5568

K= 6 PHI = 30.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	1.21756E-01	2.11612E-01	.61408983	.20903468	.06104440	.06846347	.33922648	0.0000	.5754
4	.03490124	1.21836E-01	2.12017E-01	.61678737	.20[illegible]1952	.06214759	.06643570	.33901278	.0476	.5746
5	.03576202	1.21765E-01	2.12084E-01	.61939484	.1958[illegible]4	.06183202	.06544628	.33888612	.0952	.5742
6	.03662280	1.21589E-01	2.11943E-01	.62172009	.1897[illegible]22	.06143642	.06440447	.33872915	.1429	.5737
7	.03748358	1.21300E-01	2.11688E-01	.62401558	.18397[illegible]3	.0613[illegible]2	.06431882	.33854647	.1905	.5731
8	.03834436	1.20937E-01	2.11271E-01	.62[illegible]046	.17823112	.06[illegible]2	.063[illegible]509	.33835336	.2381	.5724
9	.03920513	1.20484E-01	2.10771E-01	.62837635	.1728[illegible]4	.06[illegible]160	.0635[illegible]3	.33812272	.2857	.5716
10	.04006591	1.19957E-01	2.10157E-01	.630[illegible]51	.16755188	.06[illegible]2	.06525922	.33787482	.3333	.5708
11	.04092669	1.19362E-01	2.09455E-01	.63257066	.1625[illegible]18	.05976233	.06293786	.33759814	.3810	.5699
12	.04178747	1.18703E-01	2.08671E-01	.63462216	.157[illegible]84	.0525[illegible]476	.06267021	.33730122	.4286	.5689
13	.04264825	1.17688E-01	2.07807E-01	.63[illegible]623	.15289121	.05[illegible]124	.06243577	.33698037	.4762	.5678
14	.04350902	1.17216E-01	2.06867E-01	.63867255	.14825[illegible]55	.0590[illegible]2	.06221842	.33663846	.5238	.5666
15	.04436980	1.16392E-01	2.05856E-01	.64067938	.14372[illegible]05	.0589[illegible]46	.06201529	.33627467	.5714	.5654
16	.04523058	1.15518E-01	2.04776E-01	.64268101	.13928777	.058[illegible]24	.06182743	.33588944	.6190	.5641
17	.04609136	1.14589E-01	2.03627E-01	.644[illegible]39	.1342[illegible]89	.05851913	.06165[illegible]8	.33548238	.6667	.5627
18	.04695214	1.13614E-01	2.02412E-01	.646[illegible]156	.15[illegible]22	.058[illegible]2	.06144466	.33505313	.7143	.5613
19	.04781291	1.12[illegible]4E-01	2.01123E-01	.6487[illegible]62	.12[illegible]37[illegible]68	.058[illegible]5	.06135[illegible]7	.33460024	.7619	.5598
20	.04867369	1.11516E-01	1.99761E-01	.65075085	.12215413	.058[illegible]9	.06119[illegible]3	.33412411	.8095	.5582
21	.04953447	1.10370E-01	1.98327E-01	.65242694	.11794[illegible]52	.0583[illegible]4	.06125541	.33361806	.8571	.5565
22	.05039525	1.09194E-01	1.96834E-01	.654[illegible]66	.11376[illegible]3	.05824185	.06092455	.33309237	.9048	.5548
23	.05125603	1.07507E-01	1.95190E-01	.65710426	.1094[illegible]23	.0582[illegible]17	.06080696	.33251456	.9524	.5528
24	.05211680	1.06654E-01	1.93585E-01	.65921686	.10553[illegible]3	.0583[illegible]00	.06068293	.33[illegible]4940	1.0000	.5509

K=12 PHI = 90.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	7.84464E-02	1.54566E-01	.65035462	.22138373	.14341625	.06846347	.31857806	0.0000	.5075
4	.03515772	7.90557E-02	1.57715E-01	.65846127	.21725474	.14557458	.04813115	.31662132	.0476	.5012
5	.03625495	7.95594E-02	1.59162E-01	.65974243	.21256480	.14106367	.04112604	.31610389	.0952	.4996
6	.03735224	7.99[illegible]E-02	1.6[illegible]E-01	.66[illegible]93	.2[illegible]1749	.139[illegible]	.03[illegible]5202	.31595389	.1429	.4991
7	.03842953	8.0[illegible]E-02	1.6[illegible]E-01	[illegible]	[illegible]	.137[illegible]36	.03[illegible]42	.31578758	.1905	.4986
8	.0395[illegible]675	8.03714E-02	1.615[illegible]E-01	.66594787	.1[illegible]80	.1361[illegible]01	.03[illegible]9	.31566959	.2381	.4982
9	.04062431	8.04[illegible]E-02	1.62675E-01	.66779207	.1[illegible]87	.13547719	.03134359	.31553597	.2857	.4978
10	.041[illegible]27	8.0[illegible]E-02	1.6[illegible]E-01	.67[illegible]03	.1915[illegible]25	.13[illegible]	.02[illegible]7111	.31540468	.3333	.4974
11	.04[illegible]1053	8.0[illegible]E-02	1.6[illegible]E-01	.67119[illegible]	.18[illegible]0	.1315[illegible]45	.02[illegible]8012	.315[illegible]	.3810	.4969
12	.04391579	8.0[illegible]E-02	1.61[illegible]E-01	.67[illegible]5	.18[illegible]63	.12[illegible]18	.02716917	.31520935	.4286	.4964
13	.04501534	8.0[illegible]E-02	1.6[illegible]E-01	.6745[illegible]21	.1[illegible]18	.12[illegible]1	.02[illegible]591	.31492572	.4762	.4959
14	.04611053	8.01054E-02	1.6[illegible]E-01	.67595240	.177[illegible]6	.1274[illegible]	.02611290	.31473419	.5238	.4953
15	.04723756	7.9[illegible]E-02	1.61474E-01	.677[illegible]89	.17[illegible]2	.12[illegible]86	.02[illegible]5	.31452746	.5714	.4946
16	.04830482	7.95[illegible]E-02	1.61[illegible]E-01	.678[illegible]55	.174[illegible]2	.12517112	.024[illegible]29	.31430218	.6190	.4939
17	.049[illegible]07	7.92[illegible]E-02	1.60[illegible]E-01	.6[illegible]69	.168[illegible]39	.12415784	.024[illegible]45	.31405939	.6667	.4932
18	.05[illegible]553	7.89[illegible]E-02	1.6[illegible]E-01	.68[illegible]8	.16[illegible]37	.12[illegible]25	.02377144	.31379432	.7143	.4923
19	.05[illegible]459	7.85[illegible]E-02	1.59[illegible]E-01	.68[illegible]75	.16[illegible]55	.12[illegible]77	.02332849	.31351461	.7619	.4915
20	.05265585	7.80[illegible]E-02	1.5919[illegible]E-01	.68[illegible]93	.1[illegible]	.121[illegible]77	.02291432	.31321630	.8095	.4905
21	.05379110	7.75515E-02	1.58437E-01	.68659592	.1[illegible]04	.12075[illegible]3	.02254379	.31288291	.8571	.4895
22	.05488836	7.70371E-02	1.57725E-01	.68811485	.1[illegible]85	.12[illegible]6	.02216695	.31254696	.9048	.4884
23	.05598562	7.64018E-02	1.56824E-01	.68981249	.15079797	.11950487	.02188680	.31214288	.9524	.4872
24	.05708288	7.58306E-02	1.56024E-01	.69135403	.14800532	.11876890	.02158788	.31177491	1.0000	.4860

K=13 PHI =100.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	7.18511E-02	1.45187E-01	.65879716	.22411804	.14632776	.06846347	.31460630	0.0000	.4949
4	.03519783	7.24[illegible]E-02	1.48700E-01	.66518388	.2205[illegible]27	.14641768	.04373049	.31222875	.0476	.4874
5	.03635520	7.29[illegible]E-02	1.50[illegible]E-01	.66851981	.2162[illegible]12	.144[illegible]	.035[illegible]	.31161835	.0952	.4855
6	.03751257	7.33[illegible]E-02	1.51315E-01	.670[illegible]76	.21197552	.14[illegible]	.03187008	.31146543	.1429	.4851
7	.03866993	7.37[illegible]E-02	1.52114E-01	.672[illegible]157	.20[illegible]3	.139[illegible]15	.02671258	.31130343	.1905	.4845
8	.03982730	7.3[illegible]E-02	1.52673E-01	.6745[illegible]93	.20[illegible]46	.13787157	.02[illegible]93	.31121336	.2381	.4843
9	.04098466	7.4[illegible]E-02	1.5[illegible]E-01	.6782[illegible]79	.20[illegible]17	.13[illegible]	.02[illegible]1725	.31110920	.2857	.4839
10	.04214203	7.41[illegible]E-02	1.53[illegible]E-01	.67797847	.1[illegible]75	.13[illegible]	.02[illegible]660	.31100556	.3333	.4836
11	.04329940	7.41513E-02	1.53[illegible]E-01	.6765[illegible]61	.1[illegible]	.13[illegible]66	.02[illegible]5905	.31[illegible]9743	.3810	.4833
12	.04445676	7.4[illegible]E-02	1.55[illegible]E-01	.681[illegible]77	.1[illegible]8	.13[illegible]21	.02147116	.31076988	.4286	.4829
13	.04561413	7.40712E-02	1.55[illegible]E-01	.68[illegible]19	.1[illegible]2	.12[illegible]13	.02[illegible]231	.31063065	.4762	.4825
14	.04677150	7.3[illegible]E-02	1.54[illegible]E-01	.68[illegible]25	.18[illegible]2	.12[illegible]29	.01946122	.31047024	.5238	.4820
15	.04792886	7.37[illegible]E-02	1.55[illegible]E-01	.68543675	.1[illegible]5	.12657576	.01937167	.31029648	.5714	.4814
16	.04908623	7.35316E-02	1.52[illegible]E-01	.686[illegible]94	.1783[illegible]7	.1255[illegible]69	.0188[illegible]31	.31010135	.6190	.4808
17	.05024359	7.32[illegible]E-02	1.525[illegible]E-01	.68[illegible]28	.1752[illegible]58	.124[illegible]9	.01835787	.30988913	.6667	.4802
18	.051[illegible]	7.2[illegible]E-02	1.52[illegible]E-01	.6893[illegible]78	.172[illegible]1	.12[illegible]9	.0174[illegible]37	.30965769	.7143	.4794
19	.052[illegible]33	7.26[illegible]E-02	1.517[illegible]E-01	.69117526	.16[illegible]8	.12[illegible]110	.017[illegible]8	.30940286	.7619	.4787
20	.05371[illegible]9	7.2[illegible]E-02	1.511[illegible]E-01	.6925[illegible]69	.166[illegible]3	.12[illegible]97	.017[illegible]83	.30913258	.8095	.4778
21	.05487[illegible]6	7.17[illegible]E-02	1.50[illegible]E-01	.69407077	.164[illegible]8	.12[illegible]83	.01684209	.30882524	.8571	.4769
22	.05[illegible]42	7.13[illegible]E-02	1.49[illegible]E-01	.69557612	.16154245	.119[illegible]10	.01660294	.30851367	.9048	.4759
23	.05718779	7.07667E-02	1.490[illegible]E-01	.65710429	.15858455	.11852[illegible]10	.01634492	.30813428	.9524	.4747
24	.05834516	7.02467E-02	1.48530E-01	.69866613	.15602594	.11777461	.01608811	.30778265	1.0000	.4737

K=14 PHI =110.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	6.67098E-02	1.36951E-01	.66657271	.22[illegible]	.14[illegible]	.06846347	.31095275	0.0000	.4835
4	.03526198	6.68[illegible]E-02	1.40818E-01	.674[illegible]66	.22[illegible]3	.14[illegible]9	.03[illegible]011	.30[illegible]6912	.0476	.4745
5	.03648349	6.73[illegible]E-02	1.42[illegible]E-01	.6775[illegible]8	.22[illegible]3	.14[illegible]9	.02918092	.30735615	.0952	.4723
6	.03770501	6.77[illegible]E-02	1.43[illegible]E-01	.67[illegible]87	.216[illegible]3	.14[illegible]	.02[illegible]971	.30722030	.1429	.4719
7	.03892652	6.80[illegible]E-02	1.44314E-01	.6815[illegible]80	.21[illegible]6	.14[illegible]73	.02[illegible]855	.30708398	.1905	.4715
8	.04014803	6.82[illegible]E-02	1.44867E-01	.6832[illegible]8	.20[illegible]218	.13[illegible]70	.02057836	.30702755	.2381	.4713
9	.04136955	6.84[illegible]E-02	1.45276E-01	.68487465	.20[illegible]3	.13[illegible]	.01960875	.30695977	.2857	.4711
10	.04259106	6.85[illegible]E-02	1.45554E-01	.686[illegible]18	.20[illegible]1	.13[illegible]49	.01777960	.30688861	.3333	.4709

K= 7 PHI = 40.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03400000	1.15891E-01	2.00280E-01	.61799632	.21007995	.00000000	.06846347	.33684249	0.0000	.5673
4	.03492005	1.16063E-01	2.00307E-01	.62119210	.20819421	.00000000	.06451413	.33643829	.0476	.5680
5	.03580763	1.16209E-01	2.00534E-01	.62379022	.19970965	.00000000	.06283850	.33624677	.0952	.5653
6	.03659121	1.16369E-01	2.00537E-01	.62612870	.19187127	.00000000	.06190452	.33604825	.1429	.5648
7	.03757479	1.16507E-01	2.00537E-01	.62852021	.18811196	.00000000	.06040947	.33560847	.1905	.5642
8	.03845837	1.16572E-01	2.00700E-01	.63[illegible]	.18[illegible]	.00000000	.06[illegible]78	.33531707	.2381	.5635
9	.03934195	1.16588E-01	2.00[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.06[illegible]25	.33[illegible]058	.2857	.5628
10	.04022553	1.16[illegible]E-01	2.00[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.05[illegible]03	.33[illegible]09	.3333	.5620
11	.04110911	1.16[illegible]E-01	2.00[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.05[illegible]50	.33[illegible]48	.3810	.5611
12	.04199269	1.16[illegible]E-01	2.00[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.05[illegible]38	.33[illegible]40	.4286	.5601
13	.04287627	1.17[illegible]E-01	2.00[illegible]E-01	.64[illegible]	.17[illegible]	.00000000	.05[illegible]12	.33[illegible]81	.4762	.5591
14	.04375986	1.17[illegible]E-01	2.00[illegible]E-01	.64[illegible]	.15[illegible]	.00000000	.05[illegible]41	.33[illegible]31	.5238	.5580
15	.04464344	1.17[illegible]E-01	2.00[illegible]E-01	.64[illegible]	.14[illegible]	.00000000	.05[illegible]46	.33[illegible]12	.5714	.5568
16	.04552702	1.17[illegible]E-01	1.99[illegible]E-01	.64[illegible]	.14[illegible]	.00000000	.05[illegible]45	.33[illegible]45	.6190	.5554
17	.04641060	1.17[illegible]E-01	1.99[illegible]E-01	.64[illegible]	.13[illegible]	.00000000	.05[illegible]36	.33[illegible]97	.6667	.5543
18	.04729418	1.17[illegible]E-01	1.99[illegible]E-01	.65[illegible]	.13[illegible]	.00000000	.05[illegible]51	.33[illegible]26	.7143	.5529
19	.04817776	1.17[illegible]E-01	1.98[illegible]E-01	.65[illegible]	.13[illegible]	.00000000	.05[illegible]0	.33[illegible]67	.7619	.5515
20	.04906134	1.17[illegible]E-01	1.98[illegible]E-01	.65[illegible]	.12[illegible]	.00000000	.05[illegible]76	.33[illegible]22	.8095	.5499
21	.04994492	1.16[illegible]E-01	1.97[illegible]E-01	.65[illegible]	.12[illegible]	.00000000	.05[illegible]52	.33[illegible]33	.8571	.5483
22	.05082850	1.16[illegible]E-01	1.97[illegible]E-01	.65[illegible]	.11[illegible]	.00000000	.05[illegible]02	.33[illegible]41	.9048	.5467
23	.05171208	1.16[illegible]E-01	1.97[illegible]E-01	.66[illegible]	.11[illegible]	.00000000	.05[illegible]25	.33[illegible]90	.9524	.5448
24	.05259566	1.16[illegible]E-01	1.97[illegible]E-01	.66[illegible]	.11[illegible]	.00000000	.05[illegible]96	.32955577	1.0000	.5430

K= 8 PHI = 50.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03400000	1.09973E-01	1.95[illegible]E-01	.62[illegible]	.21[illegible]	.00000000	.06[illegible]7	.33389369	0.0000	.5574
4	.03495367	1.09[illegible]E-01	1.96[illegible]E-01	.62[illegible]	.20[illegible]	.00000000	.06[illegible]4	.33325562	.0476	.5553
5	.03580688	1.09[illegible]E-01	1.97[illegible]E-01	.62[illegible]	.[illegible]	.00000000	.05[illegible]4	.33300744	.0952	.5545
6	.03678009	1.09[illegible]E-01	1.97[illegible]E-01	.63[illegible]	.19[illegible]	.00000000	.05[illegible]4	.33284897	.1429	.5539
7	.03769329	1.09[illegible]E-01	1.97[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.05[illegible]4	.33265490	.1905	.5533
8	.03860650	1.09[illegible]E-01	1.97[illegible]E-01	.63[illegible]	.18[illegible]	.00000000	.05[illegible]1	.33246913	.2381	.5527
9	.03951970	1.09[illegible]E-01	1.97[illegible]E-01	.63[illegible]	.17[illegible]	.00000000	.05[illegible]9	.33250070	.2857	.5520
10	.04043291	1.09[illegible]E-01	1.96[illegible]E-01	.64[illegible]	.17[illegible]	.00000000	.05[illegible]6	.33202227	.3333	.5512
11	.04134611	1.09[illegible]E-01	1.96[illegible]E-01	.64[illegible]	.17[illegible]	.00000000	.05[illegible]0	.33176867	.3810	.5504
12	.04225932	1.09[illegible]E-01	1.95[illegible]E-01	.64[illegible]	.16[illegible]	.00000000	.05[illegible]0	.33149847	.4286	.5495
13	.04317252	1.09[illegible]E-01	1.95[illegible]E-01	.64[illegible]	.16[illegible]	.00000000	.05[illegible]6	.33120745	.4762	.5485
14	.04408573	1.09[illegible]E-01	1.94[illegible]E-01	.64[illegible]	.15[illegible]	.00000000	.05[illegible]3	.33[illegible]46	.5238	.5475
15	.04499894	1.09[illegible]E-01	1.93[illegible]E-01	.64[illegible]	.15[illegible]	.00000000	.05[illegible]9	.33[illegible]54	.5714	.5464
16	.04591215	1.09[illegible]E-01	1.93[illegible]E-01	.65[illegible]	.14[illegible]	.00000000	.05[illegible]9	.33021991	.6190	.5452
17	.04682535	1.09[illegible]E-01	1.92[illegible]E-01	.65[illegible]	.14[illegible]	.00000000	.05[illegible]5	.32985157	.6667	.5440
18	.04773856	1.09[illegible]E-01	1.91[illegible]E-01	.65[illegible]	.13[illegible]	.00000000	.05[illegible]0	.32946303	.7143	.5427
19	.04865177	1.09[illegible]E-01	1.90[illegible]E-01	.65[illegible]	.13[illegible]	.00000000	.05[illegible]5	.32905299	.7619	.5414
20	.04956497	1.02[illegible]E-01	1.89[illegible]E-01	.65[illegible]	.13[illegible]	.00000000	.04[illegible]7	.32862138	.8095	.5400
21	.05047818	1.02[illegible]E-01	1.87[illegible]E-01	.66[illegible]	.12[illegible]	.00000000	.04[illegible]2	.32816117	.8571	.5384
22	.05139139	1.02[illegible]E-01	1.86[illegible]E-01	.66[illegible]	.12[illegible]	.00000000	.04[illegible]3	.32768573	.9048	.5369
23	.05230459	9.91997E-02	1.85[illegible]E-01	.66[illegible]	.11[illegible]	.00000000	.04[illegible]7	.32715707	.9524	.5352
24	.05321780	9.81650E-02	1.84011E-01	.66701831	.11657736	.68957385	.04875089	.32664131	1.0000	.5335

K= 9 PHI = 60.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	.03400000	1.01388E-01	1.85674E-01	.62972128	.21[illegible]67	.11337267	.06[illegible]47	.33[illegible]993	0.0000	.5481
4	.03498988	1.01[illegible]E-01	1.87[illegible]E-01	.63[illegible]290	.2[illegible]775	.11377481	.07[illegible]47	.32955264	.0476	.5430
5	.03593930	1.01[illegible]E-01	1.88[illegible]E-01	.63[illegible]22	.2[illegible]171	.11275[illegible]	.05[illegible]192	.32[illegible]511	.0952	.5420
6	.03688872	1.02[illegible]E-01	1.89[illegible]E-01	.63[illegible]6	.19[illegible]51	.11176[illegible]	.05[illegible]3	.32[illegible]065	.1429	.5415
7	.03783814	1.02[illegible]E-01	1.88[illegible]E-01	.64[illegible]117	.1[illegible]134	.11[illegible]	.05[illegible]28	.32[illegible]528	.1905	.5408
8	.03878755	1.02[illegible]E-01	1.88[illegible]E-01	.64[illegible]814	.18[illegible]27	.11[illegible]	.05[illegible]88	.32870951	.2381	.5402
9	.03973697	1.01[illegible]E-01	1.88[illegible]E-01	.64[illegible]61	.18[illegible]04	.11[illegible]11	.04[illegible]84	.32850788	.2857	.5396
10	.04068639	1.01[illegible]E-01	1.88[illegible]E-01	.64[illegible]916	.17[illegible]75	.10[illegible]27	.04[illegible]59	.32829257	.3333	.5389
11	.04163580	1.01[illegible]E-01	1.88[illegible]E-01	.64[illegible]49	.17[illegible]73	.10[illegible]59	.04[illegible]3	.32805842	.3810	.5381

12	.04258522	1.01064E-01	1.88194E-01	[illegible]	[illegible]	.10447875	[illegible]	.32780952	.4286	.5373
13	.04357464	[illegible]	1.87654E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32734152	.4762	.5364
14	.04448406	[illegible]	1.87124E-01	.65517949	[illegible]	[illegible]	[illegible]	.32725578	.5238	.5355
15	.04541347	9.768[illegible]E-02	1.86524E-01	.6551[illegible]	[illegible]	.10461781	[illegible]	.32695207	.5714	.5345
16	.04673289	9.917[illegible]E-02	1.85833E-01	.65784871	[illegible]	[illegible]	.04434377	.32462969	.6190	.5334
17	.04733251	9.852[illegible]E-02	1.85[illegible]E-01	[illegible]	[illegible]	.10962743	.04427701	.32428860	.6667	.5323
18	.04829172	9.786[illegible]E-02	1.8[illegible]E-01	.66112071	[illegible]	.10316437	.04394287	.32532851	.7143	.5311
19	.04923114	9.718[illegible]E-02	1.83[illegible]E-01	[illegible]	[illegible]	[illegible]	.04346245	.32504656	.7619	.5279
20	.05018056	9.64[illegible]E-02	1.82[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32514589	.8095	.5286
21	.05112938	9.561[illegible]E-02	1.815[illegible]E-01	[illegible]	[illegible]	.10218641	[illegible]	.32471590	.8571	.5272
22	.05207939	9.47[illegible]E-02	1.80[illegible]E-01	[illegible]	[illegible]	[illegible]	.04253073	.32427293	.9048	.5258
23	.05302881	9.334[illegible]E-02	1.79[illegible]E-01	[illegible]	[illegible]	.10168946	[illegible]	.32377579	.9524	.5242
24	.05337823	9.29444E-02	1.77845E-01	.57211637	[illegible]	.10149228	.04179266	.32[illegible]619	1.0000	.5226

K=10 PHI = 70.0 Z = .10[illegible]

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03494047	9.352[illegible]E-02	1.75270E-01	[illegible]	.21626750	.12642415	[illegible]	.32669034	0.0000	.5336
4	.03575298	9.33[illegible]E-02	1.77[illegible]E-01	[illegible]	[illegible]	.126772[illegible]	[illegible]	.32545679	.0476	.5296
5	.03[illegible]549	9.4[illegible]E-02	1.78[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32[illegible]9135	.0952	.5284
6	.037018[illegible]	9.45[illegible]E-02	1.791[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]1100	.1429	.5278
7	.03801051	9.467[illegible]E-02	1.79[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32471969	.1905	.5272
8	.039[illegible]	9.47[illegible]E-02	1.76[illegible]E-01	[illegible]	.19371441	[illegible]	[illegible]	.32455938	.2381	.5267
9	.039[illegible]	9.46[illegible]E-02	1.79[illegible]E-01	.651[illegible]	.19417133	[illegible]	.04576111	.32437214	.2857	.5261
10	.040[illegible]	9.45516E-02	1.77935E-01	.655[illegible]	.1918[illegible]	.11657767	.04261662	.32418432	.3333	.5255
11	.04198055	9.43677E-02	1.75816E-01	[illegible]	.17785150	[illegible]	.04159314	.32537577	.3810	.5248
12	.04297307	9.41231E-02	1.75[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32379403	.4286	.5241
13	.04[illegible]	9.3[illegible]E-02	1.74[illegible]E-01	[illegible]	[illegible]	.116[illegible]	[illegible]	.32351478	.4762	.5233
14	.04455909	9.2[illegible]E-02	1.7[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32325845	.5238	.5225
15	.04[illegible]60	9.2[illegible]E-02	1.784[illegible]E-01	[illegible]	[illegible]	.11437[illegible]	[illegible]	.32294529	.5714	.5216
16	.04694511	9.2613[illegible]E-02	1.779[illegible]E-01	.6[illegible]414936	[illegible]	.1142[illegible]	[illegible]	.32263332	.5190	.5207
17	.04795542	9.211[illegible]E-02	1.77262E-01	.66[illegible]931	.1[illegible]11599	[illegible]	.05746909	.32239466	.6667	.5197
18	.04872813	9.157[illegible]E-02	1.75579E-01	.66754629	[illegible]	[illegible]	.05637876	.32205656	.7143	.5186
19	.04932664	9.0333[illegible]E-02	1.75821E-01	.6651[illegible]251	[illegible]	.11249[illegible]2	.05655078	.32170784	.7619	.5175
20	.05091315	9.0[illegible]E-02	1.750[illegible]E-01	[illegible]	[illegible]	.11202457	.05611245	.32134144	.8095	.5163
21	.05170566	8.966[illegible]E-02	1.74094E-01	[illegible]	[illegible]	.11156465	.05572754	.32094453	.8571	.5150
22	.05[illegible]817	8.95[illegible]E-02	1.73155E-01	[illegible]	[illegible]	.11116101	[illegible]	.32053840	.9048	.5137
23	.05399059	8.91[illegible]E-02	1.72[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.32007419	.9524	.5122
24	.05488320	8.73546E-02	1.71005E-01	.67[illegible]9230	.1315[illegible]	[illegible]	.05470967	.31963460	1.0000	.5109

K=11 PHI = 80.0 Z = .10[illegible]

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	8.57626E-02	1.64752E-01	.64[illegible]	[illegible]	.13459183	.06846347	.32266214	0.0000	.5206
4	.03508224	8.63[illegible]E-02	1.674[illegible]E-01	[illegible]	[illegible]	[illegible]	.05216472	.32109387	.0476	.5155
5	.03612401	8.67[illegible]E-02	1.69735E-01	.6511[illegible]	[illegible]	[illegible]	[illegible]	.32063213	.0952	.5140
6	.03716579	8.70427E-02	1.69[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.5135
7	.038[illegible]	8.725[illegible]E-02	1.70112E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]856	.1905	.5129
8	.03924933	8.737[illegible]E-02	1.70437E-01	.65[illegible]	[illegible]	[illegible]	.05915191	.32015150	.2381	.5125
9	.04029111	8.742[illegible]E-02	1.707[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31999151	.2857	.5120
10	.04133289	8.73[illegible]E-02	1.70[illegible]E-01	.6619[illegible]63	.1[illegible]55116	[illegible]	[illegible]	.31985214	.3333	.5115
11	.04237465	8.723[illegible]E-02	1.70875E-01	[illegible]	[illegible]	[illegible]	.05534071	.31965482	.3810	.5109
12	.04341643	8.714[illegible]E-02	1.707[illegible]E-01	[illegible]	[illegible]	[illegible]	.05416885	.31946376	.4286	.5103
13	.04445820	8.6[illegible]E-02	1.70[illegible]E-01	.66651121	[illegible]	[illegible]	[illegible]	.31925742	.4762	.5096
14	.04549997	8.6477[illegible]E-02	1.70519E-01	.66815519	[illegible]	[illegible]	[illegible]	.31903322	.5238	.5089
15	.046541[illegible]	8.6[illegible]E-02	1.69[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31878549	.5714	.5081
16	.04758352	8.[illegible]E-02	1.65[illegible]E-01	.6713[illegible]	[illegible]	.12198[illegible]	[illegible]	.31851535	.6190	.5073
17	.04862529	8.5[illegible]E-02	1.67[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]	.31825769	.6667	.5064
18	.04966737	8.51[illegible]E-02	1.68[illegible]E-01	[illegible]	[illegible]	[illegible]	[illegible]19455	.31796804	.7143	.5055
19	.05070[illegible]	8.48[illegible]E-02	1.67[illegible]E-01	.67612229	[illegible]	[illegible]	[illegible]	.31765067	.7619	.5045
20	.05175061	8.415[illegible]E-02	1.67152E-01	.67777165	[illegible]	[illegible]	[illegible]	.31731962	.8095	.5035
21	.05279239	8.35632E-02	1.663[illegible]E-01	.679[illegible]	[illegible]	[illegible]	[illegible]	.31695587	.8571	.5023
22	.05383416	8.29618E-02	1.65547E-01	.68[illegible]	[illegible]	.11725172	.02852563	.31658706	.9048	.5011
23	.05487593	8.22[illegible]E-02	1.64557E-01	.682[illegible]	[illegible]	.11676[illegible]	.02818783	.31615445	.9524	.4998
24	.05591770	8.15822E-02	1.63653E-01	.68[illegible]3212	.13971731	.116[illegible]	.027[illegible]6290	.31575506	1.0000	.4985

11	.04381258	6.85817E-02	1.45711E-01	.68773924	.19875453	.12948400	.01684851	.30681197	.3810	.4707
12	.04503409	[illegible]	1.45782E-01	[illegible]	.19573685	[illegible]	[illegible]	.30670928	.4286	.4704
13	.04625560	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01135359	.30659992	.4762	.4700
14	.04747712	[illegible]	[illegible]	.69197242	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.4696
15	[illegible]	[illegible]	[illegible]	.69531749	[illegible]	[illegible]	[illegible]	.30631295	.5714	.4691
16	[illegible]	6.87531E-02	[illegible]	[illegible]	[illegible]	.12165142	.01579449	.30613898	.6190	.4686
17	.05114166	[illegible]	[illegible]	[illegible]	.18182772	.12035445	.01341873	[illegible]	.6657	.4680
18	[illegible]	6.75479E-02	[illegible]	.69756540	[illegible]	.11915514	[illegible]	[illegible]	.7143	.4674
19	[illegible]	[illegible]	1.44024E-01	[illegible]	[illegible]	[illegible]	.01275092	.30545397	.7619	.4666
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.11640035	.01247740	[illegible]	.8095	.4659
21	[illegible]	6.64731E-02	[illegible]	.70154078	[illegible]	[illegible]	.01222798	[illegible]	.8571	.4650
22	.05724925	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9048	.4640
23	.05847074	6.55200E-02	[illegible]	[illegible]	.16617016	[illegible]	.01179005	[illegible]	.9524	.4629
24	.05969225	6.50429E-02	1.40828E-01	.70607645	[illegible]	.11321158	.01150146	.30392749	1.0000	.4619

K=15 PHI =120.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	6.18737E-02	1.30181E-01	.67455565	[illegible]	.13720818	[illegible]	.30781603	0.0000	.4738
4	.03552807	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30438003	.0476	.4652
5	.03661567	6.26907E-02	[illegible]	[illegible]	.22798310	[illegible]	[illegible]	.30356418	.0952	.4608
6	.03760327	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01975208	.30346192	.1429	.4604
7	.03919087	6.33547E-02	[illegible]	[illegible]	.21563816	[illegible]	.01695126	.30335215	.1905	.4601
8	.04047847	[illegible]	1.38143E-01	.69145478	[illegible]	[illegible]	.01522335	.30330975	.2381	.4600
9	.04176607	[illegible]	[illegible]	.66250719	[illegible]	[illegible]	[illegible]	.30327243	.2857	.4599
10	.04305357	6.37649E-02	1.38725E-01	[illegible]	[illegible]	[illegible]	[illegible]	.30320997	.3333	.4597
11	.04434127	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30315361	.3810	.4595
12	[illegible]	[illegible]	1.38477E-01	[illegible]	[illegible]	[illegible]	.01149459	[illegible]	.4286	.4592
13	.04691647	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4762	.4589
14	.04820407	[illegible]	[illegible]	[illegible]	.19576710	[illegible]	[illegible]	[illegible]	.5238	.4585
15	.04949167	6.34467E-02	1.38501E-01	[illegible]	.19516757	[illegible]	[illegible]	[illegible]	.5714	.4581
16	.05077927	[illegible]	1.38243E-01	.70217007	[illegible]	[illegible]	[illegible]	.30252392	.6190	.4576
17	.05206687	6.35537E-02	1.37913E-01	[illegible]	[illegible]	[illegible]	.00945321	.30233515	.6667	.4570
18	.05335447	6.27693E-02	1.37530E-01	.70477574	[illegible]	.11141749	.00910061	.30212612	.7143	.4564
19	.05464207	6.24576E-02	1.37063E-01	[illegible]	.18516150	[illegible]	.00894800	.30188648	.7619	.4557
20	.05592967	6.21245E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30163266	.8095	.4549
21	.05721727	6.17176E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30132936	.8571	.4540
22	.05850487	6.13135E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30102791	.9048	.4531
23	.05979247	6.07726E-02	[illegible]	.71197996	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.4519
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0000	[illegible]

K=16 PHI =150.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	5.82509E-02	1.24579E-01	.68162203	[illegible]	[illegible]	[illegible]	.30531542	0.0000	.4661
4	.03539783	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30130276	.0476	.4539
5	.03674719	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0952	.4512
6	.03810055	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30031367	.1429	.4509
7	.03945391	[illegible]	[illegible]	.69751428	[illegible]	[illegible]	[illegible]	[illegible]	.1905	.4507
8	[illegible]	[illegible]	[illegible]	.69897514	[illegible]	[illegible]	[illegible]	.30018231	.2381	.4505
9	.04216063	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2857	.4505
10	.04351400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3333	.4503
11	.04486736	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3810	.4501
12	.04622072	[illegible]	1.33051E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29993555	.4286	.4498
13	.04757408	5.97447E-02	1.32915E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29985209	.4762	.4495
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5238	.4491
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.4486
16	.05163416	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29937056	.6190	.4481
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.4475
18	.05434089	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.4469
19	[illegible]	5.83737E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.4461
20	.05704761	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.4453
21	.05840097	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00581568	.29810012	.8571	.4443
22	.05975433	[illegible]	[illegible]	.71725173	[illegible]	[illegible]	[illegible]	.29777716	.9048	.4434
23	.06110769	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.4421

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
24	.06246105	5.61478E-02	1.27342E-01	.72049346	.17650415	.07388560	.00546150	.29695823	1.0000	.4409

K=17 PHI =140.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	5.58581E-02	1.21290E-01	.68807753	.23422478	.10560774	.06846347	.30349137	0.0000	.4605
4	.03545594	5.61611E-02	1.25778E-01	.69807040	.23571711	.10725252	.02335618	.29888749	.0476	.4467
5	.03687142	5.64671E-02	1.27192E-01	.70116824	[illegible]	.10248593	.01278709	.29757744	.0952	.4440
6	.03828690	5.66711E-02	1.27788E-01	.70274725	[illegible]	[illegible]	.01019486	.29785509	.1429	.4436
7	.03970238	5.68052E-02	1.28104E-01	.70411243	.22468973	.10158610	.00874954	.29780192	.1905	.4434
8	.04111785	5.68916E-02	1.28568E-01	.70548081	.22178516	.09555171	.00740083	.29772391	.2381	.4432
9	.04253333	5.69207E-02	1.28459E-01	.70668941	[illegible]	.09772960	.00690885	.29769263	.2857	.4431
10	.04394881	5.69594E-02	1.28108E-01	.70792495	.21633549	.09569094	.00517491	.29760612	.3333	.4428
11	.04536429	5.68512E-02	1.28441E-01	.70909163	.21174288	.09423657	.00587385	.29753048	.3810	.4426
12	.04677976	5.67566E-02	1.28324E-01	.71020255	[illegible]	.09361963	.00548870	.29741369	.4286	.4423
13	.04819524	5.66227E-02	1.28137E-01	.71147766	.20876752	.09114613	.00521454	.29729949	.4762	.4419
14	.04961072	5.64557E-02	1.27849E-01	.71288716	[illegible]	.08972607	.00493224	.29713399	.5238	.4414
15	.05102620	5.62511E-02	1.27574E-01	.71360529	[illegible]	.08841658	.00475317	.29696122	.5714	.4409
16	.05244167	5.60165E-02	1.27212E-01	.71512991	.20161989	.08718730	.00455486	.29676284	.6190	.4403
17	.05385715	5.57417E-02	1.26779E-01	.71639649	[illegible]	.08660451	.00445895	.29653890	.6667	.4397
18	.05527263	5.54402E-02	1.26502E-01	.71769271	.19691209	.08459905	.00426004	.29629354	.7143	.4389
19	.05668810	5.50463E-02	1.25736E-01	.71904566	.19449770	.08186756	.00414026	.29600995	.7619	.4381
20	.05810358	5.47145E-02	1.25141E-01	.72041519	.19211688	.08288178	.00402223	.29571153	.8095	.4372
21	.05951906	5.42580E-02	1.24404E-01	.72194274	.18954616	.08196991	.00392448	.29534788	.8571	.4362
22	.06093454	5.38098E-02	1.23676E-01	.72342635	.18706504	.08108231	.00382582	.29498700	.9048	.4351
23	.06235001	5.31914E-02	1.22666E-01	.72527910	.18410751	.08029115	.00374803	.29449210	.9524	.4336
24	.06376549	5.26544E-02	1.21788E-01	.72691791	.18145307	.07947312	.00366006	.29405630	1.0000	.4323

K=18 PHI =150.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	5.43326E-02	1.18914E-01	.69537083	.23602664	.08137863	.06846347	.30229318	0.0000	.4569
4	.03551079	5.45156E-02	1.23574E-01	.70417461	.23634065	.08439688	.01801550	.29703817	.0476	.4412
5	.03698111	5.46852E-02	1.24634E-01	.70683688	.23365500	.08578424	.00916410	.29623206	.0952	.4388
6	.03845142	5.47946E-02	1.24995E-01	.70820487	[illegible]	.08148936	.00711190	.29609958	.1429	.4384
7	.03992174	5.48386E-02	1.25150E-01	.70946337	[illegible]	[illegible]	.00617679	.29605466	.1905	.4382
8	.04139206	5.48551E-02	1.25264E-01	.71071375	[illegible]	.07875013	.00519260	.29594178	.2381	.4379
9	.04286238	5.49130E-02	1.25224E-01	.71182446	.22275519	.07728700	.00486900	.29587622	.2857	.4377
10	.04433270	5.47423E-02	1.25156E-01	.71300104	[illegible]	.07571945	.00435401	.29576773	.3333	.4374
11	.04580302	5.46103E-02	1.24930E-01	.71411494	.21779558	.07478051	.00416190	.29566090	.3810	.4371
12	.04727334	5.44869E-02	1.24785E-01	.71527786	.21558788	.07373049	.00385083	.29551782	.4286	.4367
13	.04874366	5.43100E-02	1.24502E-01	.71642450	[illegible]	.07193059	.00369237	.29536360	.4762	.4362
14	.05021398	5.41074E-02	1.24188E-01	.71760710	[illegible]	.07066318	.00348515	.29518036	.5238	.4357
15	.05168430	[illegible]	1.23804E-01	.71880455	[illegible]	.06919642	.00331007	.29497805	.5714	.4351
16	.05315461	[illegible]	1.23374E-01	[illegible]	[illegible]	.06957812	.00320184	.29475082	.6190	.4344
17	.05462493	[illegible]	1.22877E-01	[illegible]	[illegible]	[illegible]	.00308752	.29449617	.6667	.4336
18	.05609525	[illegible]	1.22330E-01	[illegible]	[illegible]	[illegible]	.00297451	.29421952	.7143	.4328
19	.05756557	5.25027E-02	1.21706E-01	[illegible]	[illegible]	[illegible]	.00287957	.29390117	.7619	.4319
20	.05903589	5.21570E-02	1.21040E-01	.72541341	[illegible]	.06510205	.00278792	.29356639	.8095	.4309
21	.06050621	5.16614E-02	1.20224E-01	.72701369	[illegible]	[illegible]	.00271072	.29315820	.8571	.4297
22	.06197653	5.11711E-02	1.19415E-01	.72857621	.19153876	.06364752	.00263161	.29275081	.9048	.4285
23	.06344685	5.04932E-02	1.18269E-01	.73057767	.18819850	.06301180	.00257146	.29218730	.9524	.4269
24	.06491717	4.98977E-02	1.17296E-01	.73235820	.18537532	.06234736	.00249737	.29168485	1.0000	.4254

K=19 PHI =160.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	.03404047	5.34476E-02	1.17527E-01	.69714538	.23731152	.05784252	.06846347	.30158487	0.0000	.4548
4	.03555356	5.35290E-02	1.22434E-01	[illegible]	[illegible]	.05787170	.01272592	.29570505	.0476	.4372
5	.03706666	5.35725E-02	1.23047E-01	.71111333	.23163465	.05938611	.00654500	.29508723	.0952	.4354
6	.03857976	5.35942E-02	1.23184E-01	.71232594	.23340349	.05677475	.00538953	.29498253	.1429	.4351
7	.04009285	5.35626E-02	1.23205E-01	.71344232	.23047557	[illegible]	.00458362	.29487282	.1905	.4347
8	.04160595	5.35057E-02	1.23153E-01	.71455049	.22709768	[illegible]	.00405427	.29477653	.2381	.4345
9	.04311905	5.34090E-02	1.23021E-01	.71561614	.22557293	.05353522	.00378124	.29466740	.2857	.4341

10	.04463214	5.32838E-02	1.22844E-01	.71672182	.22319512	.05236132	.00345382	.29453423	.3333	.4339
11	.04814524	5.31273E-02	1.22604E-01	.71781138	.22 [illegible]	.05 [illegible]	.00 [illegible]	.29438944	.3810	.4333
12	.04765833	5.29415E-02	1.22319E-01	.71893581	.218 [illegible]	.05 [illegible]	.00 [illegible]	.29421739	.4286	.4328
13	.04917143	5.27272E-02	1.21978E-01	.72008783	.21 [illegible]	.04 [illegible]	.00286140	.29403048	.4762	.4323
14	.05069453	5.24845E-02	1.21581E-01	.72125775	.21 [illegible]	.04 [illegible]	.00269621	.29381945	.5238	.4316
15	.05219762	5.22134E-02	1.21115E-01	.72246738	.21 [illegible]	.04 [illegible]	.00256800	.29358739	.5714	.4310
16	.05371072	5.19115E-02	1.20 [illegible]	.72361 [illegible]	.20 [illegible]	.04 [illegible]	.00 [illegible]	.29333349	.6190	.4302
17	.05522382	5.15794E-02	1.20 [illegible]	.72 [illegible]	.20 [illegible]	.04 [illegible]	.00 [illegible]	.29308859	.6667	.4294
18	.05675691	5.12115E-02	1.19 [illegible]	.72 [illegible]	.20 [illegible]	.04 [illegible]	.00 [illegible]	.29279269	.7143	.4285
19	.05825001	5.07944E-02	1.19 [illegible]	.72 [illegible]	.20 [illegible]	.04 [illegible]	.00 [illegible]	.29239239	.7619	.4275
20	.05976311	5.03288E-02	1.18 [illegible]	.72 [illegible]	.19 [illegible]	.04 [illegible]	.00 [illegible]	.29202355	.8095	.4264
21	.06127620	4.98128E-02	1.17 [illegible]	.73 [illegible]	.19 [illegible]	.04 [illegible]	.00 [illegible]	.29157528	.8571	.4251
22	.06278930	4.92469E-02	1.16 [illegible]	.73 [illegible]	.19 [illegible]	.04 [illegible]	.00 [illegible]	.29112317	.9048	.4238
23	.06430239	4.86246E-02	1.15 [illegible]	.73 [illegible]	.19 [illegible]	.04 [illegible]	.00 [illegible]	.29049410	.9524	.4219
24	.06581549	4.79135E-02	1.14001E-01	.73650994	.18819919	.04 [illegible]	.00180464	.28992713	1.0000	.4203

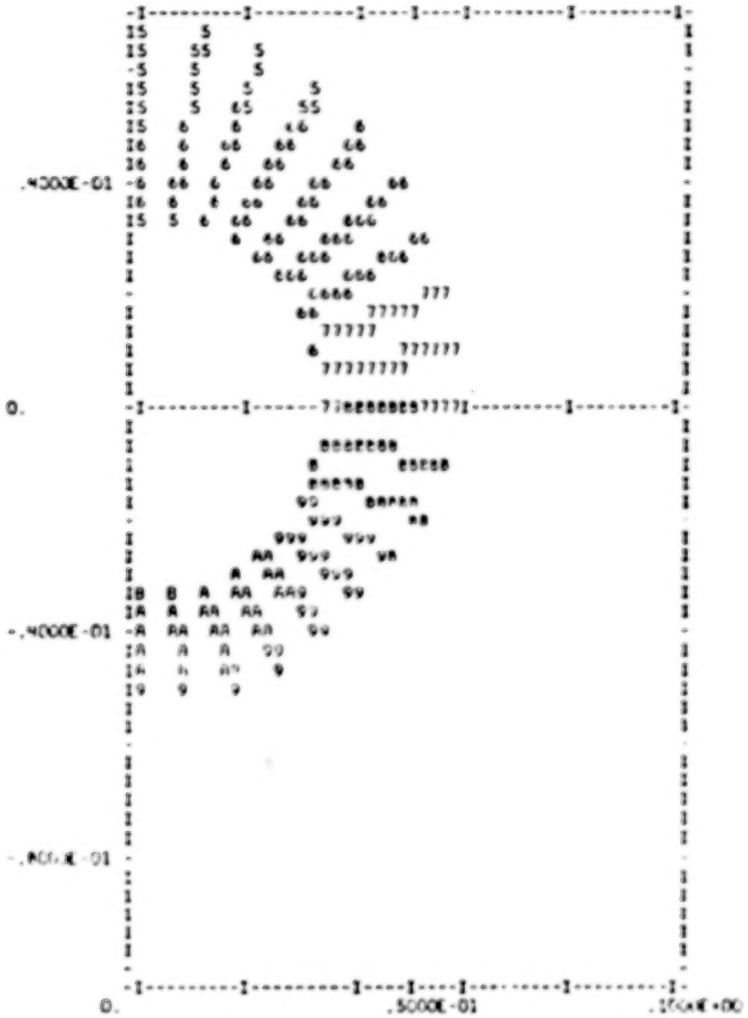
K=20 PHI =170.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SIN) J/CV	A	T	M/MT
3	.03404047	5.30018E-02	1.16826E-01	.69925885	.23 [illegible]	.02 [illegible]	.04946347	.30122418	0.0000	.4537
4	.03558102	5.30468E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	.02 [illegible]	.04 [illegible]	.29492365	.0476	.4349
5	.03712157	5.29878E-02	1.22195E-01	.71 [illegible]	.23 [illegible]	.02 [illegible]	.00538095	.29449038	.0952	.4336
6	.03866212	5.29 [illegible]E-02	1.22 [illegible]	.71 [illegible]	.23 [illegible]	.02 [illegible]	.00 [illegible]	.29436859	.1429	.4333
7	.04020267	5.28651E-02	1.22 [illegible]	.71 [illegible]	.23 [illegible]	.02 [illegible]	.00510999	.29423567	.1905	.4329
8	.04174322	5.27617E-02	1.21 [illegible]	.71 [illegible]	.22 [illegible]	.02 [illegible]	.00 [illegible]	.29411998	.2381	.4325
9	.04328377	5.26314E-02	1.21 [illegible]	.71 [illegible]	.22 [illegible]	.02 [illegible]	.00 [illegible]	.29399049	.2857	.4322
10	.04482432	5.24751E-02	1.21 [illegible]	.71 [illegible]	.22 [illegible]	.02 [illegible]	.00 [illegible]	.29383675	.3333	.4317
11	.04636487	5.22906E-02	1.21 [illegible]	.72 [illegible]	.22 [illegible]	.02 [illegible]	.00 [illegible]	.29366258	.3810	.4312
12	.04790542	5.20549E-02	1.20 [illegible]	.72 [illegible]	.22 [illegible]	.02 [illegible]	.00 [illegible]	.29348827	.4286	.4306
13	.04944597	5.18164E-02	1.20 [illegible]	.72 [illegible]	.21 [illegible]	.02 [illegible]	.00 [illegible]	.29325619	.4762	.4300
14	.05098652	5.15504E-02	1.20 [illegible]	.73 [illegible]	.21 [illegible]	.02 [illegible]	.00 [illegible]	.29302514	.5238	.4293
15	.05252707	5.12508E-02	1.19 [illegible]	.72 [illegible]	.21 [illegible]	.02 [illegible]	.00218220	.29277178	.5714	.4286
16	.05406762	5.09271E-02	1.19 [illegible]	.72 [illegible]	.21 [illegible]	.02 [illegible]	.00205147	.29249858	.6190	.4278
17	.05560817	5.05803E-02	1.18 [illegible]	.72 [illegible]	.20 [illegible]	.02 [illegible]	.00194623	.29219386	.6667	.4269
18	.05714872	5.02011E-02	1.17 [illegible]	.72 [illegible]	.20 [illegible]	.02 [illegible]	.00185611	.29187078	.7143	.4259
19	.05868927	4.97859E-02	1.17 [illegible]	.72 [illegible]	.20 [illegible]	.02 [illegible]	.00177546	.29149735	.7619	.4249
20	.06022983	4.93326E-02	1.16 [illegible]	.73 [illegible]	.20 [illegible]	.02 [illegible]	.00169893	.29111019	.8095	.4237
21	.06177038	4.87 [illegible]E-02	1.15 [illegible]	.73 [illegible]	.19 [illegible]	.02 [illegible]	.00163562	.29063414	.8571	.4223
22	.06331093	4.82 [illegible]E-02	1.14 [illegible]	.73 [illegible]	.19 [illegible]	.02 [illegible]	.00156734	.29015406	.9048	.4209
23	.06485148	4.74766E-02	1.13 [illegible]	.73 [illegible]	.19 [illegible]	.02 [illegible]	.00151921	.28948365	.9524	.4190
24	.06639203	4.67370E-02	1.12023E-01	.73006799	.18 [illegible]	.02193724	.00145106	.28886283	1.0000	.4172

K=21 PHI =180.0 Z = .100000

J	R	P	RHO	U	V	W	(S-SIN) J/CV	A	T	M/MT
3	.03404047	5.28 [illegible]E-02	1.16 [illegible]	.69 [illegible]	.23 [illegible]	0.00 [illegible]	.04 [illegible]	.30109281	0.0000	.4533
4	.03558987	5.28 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	0.00 [illegible]	.00 [illegible]	.29468527	.0476	.4342
5	.03713928	5.27 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	0.00 [illegible]	.00 [illegible]	.29432567	.0952	.4331
6	.03868869	5.27 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	0.00 [illegible]	.00 [illegible]	.29417212	.1429	.4327
7	.04023809	5.25 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	0.00 [illegible]	.00 [illegible]	.29405772	.1905	.4323
8	.04178750	5.24 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.23 [illegible]	0.00 [illegible]	.00 [illegible]	.29390313	.2381	.4319
9	.04333690	5.22 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.22 [illegible]	0.00 [illegible]	.00 [illegible]	.29376985	.2857	.4315
10	.04488631	5.21 [illegible]E-02	1.21 [illegible]	.71 [illegible]	.22 [illegible]	0.00 [illegible]	.00 [illegible]	.29360164	.3333	.4310
11	.04643572	5.19 [illegible]E-02	1.20 [illegible]	.72 [illegible]	.22 [illegible]	0.00 [illegible]	.00 [illegible]	.29342149	.3810	.4305
12	.04798512	5.17 [illegible]E-02	1.20 [illegible]	.72 [illegible]	.22 [illegible]	0.00 [illegible]	.00 [illegible]	.29321656	.4286	.4299
13	.04953453	5.15 [illegible]E-02	1.19 [illegible]	.72 [illegible]	.21 [illegible]	0.00 [illegible]	.00 [illegible]	.29299277	.4762	.4292
14	.05108394	5.13 [illegible]E-02	1.19 [illegible]	.72 [illegible]	.21 [illegible]	0.00 [illegible]	.00 [illegible]	.29275394	.5238	.4285
15	.05263334	5.09 [illegible]E-02	1.19 [illegible]	.72 [illegible]	.21 [illegible]	0.00 [illegible]	.00 [illegible]	.29249211	.5714	.4278
16	.05418275	5.05 [illegible]E-02	1.18 [illegible]	.72 [illegible]	.21 [illegible]	0.00 [illegible]	.00 [illegible]	.29221160	.6190	.4269
17	.05573215	5.02 [illegible]E-02	1.17 [illegible]	.72 [illegible]	.20 [illegible]	0.00 [illegible]	.00 [illegible]	.29189850	.6667	.4260
18	.05728156	4.98 [illegible]E-02	1.17 [illegible]	.72 [illegible]	.20 [illegible]	0.00 [illegible]	.00 [illegible]	.29156956	.7143	.4251
19	.05883097	4.94 [illegible]E-02	1.16 [illegible]	.73 [illegible]	.20 [illegible]	0.00 [illegible]	.00 [illegible]	.29119618	.7619	.4239
20	.06038037	4.89 [illegible]E-02	1.15 [illegible]	.73 [illegible]	.20 [illegible]	0.00 [illegible]	.00 [illegible]	.29079467	.8095	.4228
21	.06192978	4.85 [illegible]E-02	1.14 [illegible]	.73 [illegible]	.19 [illegible]	0.00 [illegible]	.00 [illegible]	.29030835	.8571	.4214
22	.06347919	4.78 [illegible]E-02	1.13 [illegible]	.73 [illegible]	.19 [illegible]	0.00 [illegible]	.00 [illegible]	.28981889	.9048	.4200

23	.06502859	4.70485E-02	1.12559E-01	.73788403	.19334783	0.00000000	.00140978	.29913252	.9524	.4180
24	.06657800	4.63281E-02	1.11331E-01	.73698190	.19013454	0.00000000	.00139808	.28848878	1.0000	.4161



VERTICAL SCALING

0.	0	.200E-01	.200E-01	1	.40E-01
.400E-01	2	.600E-01	.60E-01	3	.80E-01
.800E-01	4	.100E+00	.100E+00	5	.120
.120	6	.140	.140	7	.160
.160	8	.180	.180	9	.200
.200	A	.220	.220	B	.240
.240	C	.260	.260	D	.280
.280	E	.300	.300	F	.320
.320	G	.340	.340	H	.360
.360	I	.380			

SURFACE FLOW VARIABLES AT Z = .130000
X/L = .002959 DZDT= .017156 ITER= 0

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	.0340	.5004	3.8855E+00	2.5012E+00	1.7784	.6554	0.0000	3.42[illegible]E-01	1.0000	.58622	.00	6.8463E-02
10.0	.0340	.4934	3.8[illegible]E+00	2.4[illegible]E+00	1.76[illegible]	.6[illegible]	[illegible]	3.42[illegible]E-01	1.0000	.58498	.00	6.8463E-02
20.0	.0340	.4806	3.7[illegible]E+00	2.[illegible]E+00	1.7[illegible]	.6[illegible]	.1227	3.4[illegible]E-01	1.0000	.58133	.00	6.8463E-02
30.0	.0340	.4576	3.62[illegible]E+00	2.[illegible]E+00	1.8[illegible]	.6[illegible]	.1825	3.5[illegible]E-01	1.0000	.57557	.00	6.8463E-02
40.0	.0340	.4272	3.[illegible]E+00	2.[illegible]E+00	1.8[illegible]	.6[illegible]	.2345	3.[illegible]E-01	1.0000	.56731	.00	6.8463E-02
50.0	.0340	.3913	3.[illegible]E+00	2.[illegible]E+00	1.8[illegible]	.6[illegible]	.2956	3.[illegible]E-01	1.0000	.55742	.00	6.8463E-02
60.0	.0340	.3519	3.[illegible]E+00	2.[illegible]E+00	1.9[illegible]	.6[illegible]	.3431	3.[illegible]E-01	1.0000	.54605	.00	6.8463E-02
70.0	.0340	.3110	2.78[illegible]E+00	1.97[illegible]E+00	1.9[illegible]	.6[illegible]	.3870	3.[illegible]E-01	1.0000	.53360	.00	6.8463E-02
80.0	.0340	.2707	2.[illegible]E+00	1.[illegible]E+00	1.9916	.6779	.4293	3.[illegible]E-01	1.0000	.52055	.00	6.8463E-02
90.0	.0340	.2327	2.[illegible]E+00	1.[illegible]E+00	2.0[illegible]	.6949	.4752	3.[illegible]E-01	1.0000	.50746	.00	6.8463E-02
100.0	.0340	.1995	2.[illegible]E+00	1.[illegible]E+00	2.0[illegible]	.7124	.4851	3.[illegible]E-01	1.0000	.49489	.00	6.8463E-02
110.0	.0340	.1712	1.[illegible]E+00	1.[illegible]E+00	2.1[illegible]	.7[illegible]	.4983	3.[illegible]E-01	1.0000	.48346	.00	6.8463E-02
120.0	.0340	.1476	1.[illegible]E+00	1.[illegible]E+00	2.1[illegible]	.7[illegible]	.4957	3.[illegible]E-01	1.0000	.47375	.00	6.8463E-02
130.0	.0340	.1279	1.[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.7[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.46609	.00	6.8463E-02
140.0	.0340	.1114	1.[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.7[illegible]	.5480	3.[illegible]E-01	1.0000	.46054	.00	6.8463E-02
150.0	.0340	.1075	1.[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.7[illegible]	.2652	3.[illegible]E-01	1.0000	.45691	.00	6.8463E-02
160.0	.0340	.1029	1.[illegible]E+00	1.[illegible]E+00	2.3116	.7869	.1787	3.[illegible]E-01	1.0000	.45477	.00	6.8463E-02
170.0	.0340	.1006	1.[illegible]E+00	1.[illegible]E+00	2.3[illegible]	.7902	.0877	3.[illegible]E-01	1.0000	.45368	.00	6.8463E-02
180.0	.0340	.0998	1.[illegible]E+00	1.[illegible]E+00	2.3[illegible]	.7913	0.0000	3.[illegible]E-01	1.0000	.45328	.00	6.8463E-02

BODY AND SHOCK GEOMETRY AT Z = .130

PHI	RB	DRB/DZ	D**2RB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	.0340	.3380	0.0000	.0515	.5150	0.0000
10.0	.0340	.3380	0.0000	.0516	.5156	.0018
20.0	.0340	.3380	0.0000	.0518	.5176	.0036
30.0	.0340	.3380	0.0000	.0521	.5210	.0054
40.0	.0340	.3380	0.0000	.0526	.5258	.0072
50.0	.0340	.3380	0.0000	.0532	.5321	.0090
60.0	.0340	.3380	0.0000	.0540	.5397	.0108
70.0	.0340	.3380	0.0000	.0549	.5487	.0125
80.0	.0340	.3380	0.0000	.0559	.5591	.0143
90.0	.0340	.3380	0.0000	.0571	.5708	.0161
100.0	.0340	.3380	0.0000	.0584	.5839	.0179
110.0	.0340	.3380	0.0000	.0597	.5969	.0179
120.0	.0340	.3380	0.0000	.0611	.6109	.0179
130.0	.0340	.3380	0.0000	.0625	.6248	.0179
140.0	.0340	.3380	0.0000	.0638	.6378	.0179
150.0	.0340	.3380	0.0000	.0649	.6498	.0179
160.0	.0340	.3380	0.0000	.0658	.6592	.0179
170.0	.0340	.3380	0.0000	.0664	.6654	.0179
180.0	.0340	.3380	0.0000	.0666	.6674	0.0000

SURFACE FLOW VARIABLES AT Z = .768400
X/L = .022675 DZDT= .136026 ITER= 250

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	.2485	.4409	3.[illegible]E+00	2.[illegible]E+00	1.[illegible]	.5869	0.0000	3.[illegible]E-01	1.0000	.57098	.00	6.8463E-02
10.0	.2485	.4363	3.[illegible]E+00	2.[illegible]E+00	1.[illegible]	.5880	[illegible]	3.[illegible]E-01	1.0000	.56975	.00	6.8463E-02
20.0	.2485	.4227	3.[illegible]E+00	2.[illegible]E+00	1.[illegible]	.5914	.1[illegible]	3.[illegible]E-01	1.0000	.56611	.00	6.8463E-02
30.0	.2485	.4010	3.[illegible]E+00	2.[illegible]E+00	1.[illegible]	.5969	.1856	3.[illegible]E-01	1.0000	.56015	.00	6.8463E-02
40.0	.2485	.3725	3.[illegible]E+00	2.[illegible]E+00	1.[illegible]	.6047	.2[illegible]	3.[illegible]E-01	1.0000	.55208	.00	6.8463E-02
50.0	.2485	.3389	2.9[illegible]E+00	2.[illegible]E+00	1.[illegible]	.6145	.3[illegible]	3.[illegible]E-01	1.0000	.54217	.00	6.8463E-02
60.0	.2485	.3018	2.7[illegible]E+00	1.[illegible]E+00	1.[illegible]	.6262	.3551	3.[illegible]E-01	1.0000	.53068	.00	6.8463E-02
70.0	.2485	.2634	2.[illegible]E+00	1.[illegible]E+00	2.0461	.6396	.[illegible]	3.[illegible]E-01	1.0000	.51809	.00	6.8463E-02
80.0	.2485	.2261	2.[illegible]E+00	1.[illegible]E+00	2.0942	.6543	.4[illegible]	3.[illegible]E-01	1.0000	.50509	.00	6.8463E-02
90.0	.2485	.1913	2.[illegible]E+00	1.[illegible]E+00	2.1[illegible]	.6[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.49215	.00	6.8463E-02
100.0	.2485	.1601	1.[illegible]E+00	1.[illegible]E+00	2.1[illegible]	.6[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.47977	.00	6.8463E-02
110.0	.2485	.1326	1.[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.6[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.46861	.00	6.8463E-02
120.0	.2485	.1126	1.[illegible]E+00	1.[illegible]E+00	2.2[illegible]	.6[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.45923	.00	6.8463E-02
130.0	.2485	.0969	1.[illegible]E+00	1.[illegible]E+00	2.[illegible]	.7[illegible]	.4[illegible]	3.[illegible]E-01	1.0000	.45192	.00	6.8463E-02

140.0	.2485	.0857	1.4950E+00	1.2686E+00	2.3559	.7205	.3593	2.9884E-01	1.0000	.99654	.00	6.8465E-02
150.0	.2485	.0789	1.4513E+00	1.2942E+00	2.3815	.7415	.4258	2.9772E-01	1.0000	.99315	.00	6.8465E-02
160.0	.2485	.0766	1.4388E+00	1.2134E+00	2.3930	.7515	.3977	2.9759E-01	1.0000	.99203	.00	6.8465E-02
170.0	.2485	.0748	1.4292E+00	1.2078E+00	2.4042	.7556	.3968	2.9751E-01	1.0000	.99109	.00	6.8465E-02
180.0	.2485	.0728	1.4157E+00	1.2209E+00	2.4124	.7578	0.0000	2.9864E-01	1.0000	.98998	.00	6.8465E-02

BODY AND SHOCK GEOMETRY AT Z = .766

PHI	PB	DPB/DZ	DPB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	.2485	.3058	0.0000	.3843	.4855	0.0000
10.0	.2485	.3058	0.0000	.3849	.4865	.0045
20.0	.2485	.3058	0.0000	.3868	.4886	.0189
30.0	.2485	.3058	0.0000	.3899	.4928	.0194
40.0	.2485	.3058	0.0000	.3934	.4982	.0243
50.0	.2485	.3058	0.0000	.3985	.5054	.0327
60.0	.2485	.3058	0.0000	.4068	.5165	.0369
70.0	.2485	.3058	0.0000	.4192	.5347	.0478
80.0	.2485	.3058	0.0000	.4387	.5569	.0579
90.0	.2485	.3058	0.0000	.4584	.5805	.0580
100.0	.2485	.3058	0.0000	.4810	.6058	.0645
110.0	.2485	.3058	0.0000	.4922	.6212	.0704
120.0	.2485	.3058	0.0000	.4838	.6095	.0660
130.0	.2485	.3058	0.0000	.4733	.6136	.0637
140.0	.2485	.3058	0.0000	.4860	.6287	.0590
150.0	.2485	.3058	0.0000	.4655	.6018	.0698
160.0	.2485	.3058	0.0000	.4571	.6525	.0759
170.0	.2485	.3058	0.0000	.4503	.6591	.0748
180.0	.2485	.3058	0.0000	.5046	.6619	0.0000

SURFACE FLOW VARIABLES AT Z = 8.0000E+01
X/L = .236659 DZDT= 2.110117 ITLP= 500

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M-PHI	A	COMP	M/MT	TEMP	(S-S,INF)/CV
0.0	1.3000	.0448	1.2851E+00	1.1391E+00	2.5951	-.0000	0.0000	2.9257E-01	1.0000	.92799	.00	6.8465E-02
10.0	1.3000	.0435	1.2736E+00	1.1351E+00	2.5837	-.0070	.0997	2.9213E-01	1.0000	.92676	.00	6.8465E-02
20.0	1.3000	.0410	1.2516E+00	1.1264E+00	2.5634	-.0090	.1993	2.9133E-01	1.0000	.92510	.00	6.8465E-02
30.0	1.3000	.0369	1.2174E+00	1.1098E+00	2.5265	-.0060	.2995	2.8994E-01	1.0000	.91709	.00	6.8465E-02
40.0	1.3000	.0269	1.1395E+00	1.0717E+00	2.4383	-.0060	.3978	2.8681E-01	1.0000	.90901	.00	6.8465E-02
50.0	1.3000	.0211	1.0964E+00	9.5648E-01	2.4589	-.0030	.4997	2.8511E-01	1.0000	.89908	.00	6.8465E-02
60.0	1.3000	-.0162	9.0491E-01	8.8844E-01	2.2483	-.0090	.5921	2.7875E-01	1.0000	.88749	.00	6.8465E-02
70.0	1.3000	-.0552	8.0595E-01	8.1416E-01	2.0639	-.0060	.6840	2.7357E-01	1.0000	.87510	.00	6.8465E-02
80.0	1.3000	-.0942	7.1808E-01	7.5168E-01	1.9046	-.0090	.7692	2.6924E-01	1.0000	.86247	.00	6.8465E-02
90.0	1.3000	-.0835	6.3676E-01	6.8975E-01	1.7498	-.0060	.8569	2.6496E-01	1.0000	.85018	.00	6.8465E-02
100.0	1.3000	-.0751	5.7031E-01	6.3754E-01	1.6314	-.0060	.9412	2.6158E-01	1.0000	.83931	.00	6.8465E-02
110.0	1.3000	-.0936	5.2154E-01	5.9478E-01	1.5431	-.0090	.9960	2.5968E-01	1.0000	.83074	.00	6.8465E-02
120.0	1.3000	-.0878	4.8796E-01	5.7847E-01	1.5042	-.0060	.9791	2.5904E-01	1.0000	.82633	.00	6.8465E-02
130.0	1.3000	-.0893	5.0015E-01	5.8053E-01	1.5091	-.0060	.9981	2.5916E-01	1.0000	.82684	.00	6.8465E-02
140.0	1.3000	-.0821	5.2692E-01	6.0594E-01	1.5699	-.0030	.9849	2.5978E-01	1.0000	.83227	.00	6.8465E-02
150.0	1.3000	-.0750	5.8194E-01	6.4485E-01	1.6679	-.0090	.9891	2.6126E-01	1.0000	.84129	.00	6.8465E-02
160.0	1.3000	-.0651	6.2869E-01	6.8424E-01	1.7610	-.0030	.9840	2.6414E-01	1.0000	.84864	.00	6.8465E-02
170.0	1.3000	-.0609	6.5130E-01	7.0105E-01	1.8072	-.0060	.9981	2.6554E-01	1.0000	.85245	.00	6.8465E-02
180.0	1.3000	-.0594	6.6044E-01	7.0736E-01	1.8240	-.0000	0.0000	2.6602E-01	1.0000	.85379	.00	6.8465E-02

BODY AND SHOCK GEOMETRY AT Z = 8.000

PHI	PB	DPB/DZ	DPB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	1.3000	0.0000	0.0000	3.1842	.3215	0.0000
10.0	1.3000	0.0000	0.0000	3.1995	.3229	.0079
20.0	1.3000	0.0000	0.0000	3.2211	.3273	.0219
30.0	1.3000	0.0000	0.0000	3.2634	.3347	.0369
40.0	1.3000	0.0000	0.0000	3.3324	.3451	.0478
50.0	1.3000	0.0000	0.0000	3.4186	.3585	.0552
60.0	1.3000	0.0000	0.0000	3.5142	.3748	.0619
70.0	1.3000	0.0000	0.0000	3.6427	.3968	.0708
80.0	1.3000	0.0000	0.0000	3.7769	.4189	.0744
90.0	1.3000	0.0000	0.0000	3.9361	.4410	.0778

100.0	1.3000	0.0000	0.0000	[illegible]	.4674	.9972
110.0	1.3000	0.0000	0.0000	4.2818	.4954	[illegible]
120.0	1.3000	0.0000	0.0000	4.4750	.5255	[illegible]
130.0	1.3000	0.0000	0.0000	4.6431	.5500	[illegible]
140.0	1.3000	0.0000	0.0000	[illegible]	.5762	.8159
150.0	1.3000	0.0000	0.0000	[illegible]	.5975	.7185
160.0	1.3000	0.0000	0.0000	5.0544	.6141	[illegible]
170.0	1.3000	0.0000	0.0000	5.1244	.6247	[illegible]
180.0	1.3000	0.0000	0.0000	5.1454	.6277	0.0000

K= 3   PHI = 0.0   Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	4.12295E-02	9.76394E-02	.76004991	-.00000000	0.00000000	.06846347	.29060741	0.0000	.4223
4	1.49430474	4.14184E-02	1.00065E-01	.76644577	[illegible]	[illegible]	.03171536	.28700616	.0476	.4119
5	1.68876949	4.10055E-02	1.00516E-01	.76823764	[illegible]	[illegible]	.02232405	.28563556	.0952	.4079
6	1.88315425	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01731154	.28495702	.1429	.4060
7	2.07753898	4.03911E-02	[illegible]	.76811375	[illegible]	[illegible]	.01706785	.28437441	.1905	.4043
8	2.27192372	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01403859	.28397714	.2381	.4032
9	2.46630847	4.00337E-02	9.9515 [illegible]	.76956575	[illegible]	[illegible]	.01758422	.28364998	.2857	.4023
10	2.66069321	3.99914E-02	9.9556 [illegible]	.76951255	[illegible]	[illegible]	.01103725	.28347053	.3333	.4018
11	2.85507795	4.00515E-02	9.9725 [illegible]	.76613518	[illegible]	[illegible]	.00488138	.28341433	.3810	.4016
12	3.04946270	[illegible]	9.9710 [illegible]	.76710769	[illegible]	[illegible]	[illegible]	.28326834	.4286	.4012
13	3.24384744	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28303059	.4762	.4005
14	3.43823219	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28305774	.5238	.4006
15	3.63261653	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28358153	.5714	.4021
16	3.82700168	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28449977	.6190	.4047
17	4.02138642	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.4079
18	4.21577116	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.4112
19	4.41015591	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.4145
20	4.60454065	4.65318E-02	1.11544E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8095	.4177
21	4.79892540	4.78678E-02	1.13743E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29011234	.8571	.4208
22	4.99331014	4.90744E-02	1.15814E-01	[illegible]	[illegible]	[illegible]	.00365390	.29111261	.9048	.4237
23	5.18769488	5.0241 [illegible]	1.17904E-01	[illegible]	[illegible]	[illegible]	.00337186	.29214498	.9524	.4267
24	5.38207963	5.13985E-02	1.19753E-01	.75361715	[illegible]	0.00000000	[illegible]	.29298535	1.0000	.4292

K= 4   PHI = 10.0   Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	4.07056E-02	9.67515E-02	.76050671	-.00000000	.05476215	.06846347	.29007696	0.0000	.4207
4	1.49536176	4.10126E-02	9.98511E-02	.76648415	[illegible]	[illegible]	.03181837	.28661229	.0476	.4107
5	1.69378352	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28531860	.0952	.4070
6	1.88617528	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28454201	.1429	.4052
7	2.08156704	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28414759	.1905	.4037
8	2.27695880	[illegible]	[illegible]	.76651491	[illegible]	[illegible]	.01411761	.28377787	.2381	.4026
9	2.47235056	[illegible]	[illegible]	.76942133	[illegible]	[illegible]	[illegible]	.28347216	.2857	.4018
10	2.66774232	[illegible]	[illegible]	[illegible]	[illegible]	.02413485	[illegible]	.28331173	.3333	.4013
11	2.86313408	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28326833	.3810	.4012
12	3.05852585	3.98578E-02	9.94678E-02	[illegible]	[illegible]	[illegible]	.00990182	.28312513	.4286	.4008
13	3.25391761	3.97259E-02	9.92514E-02	[illegible]	[illegible]	[illegible]	[illegible]	.28290176	.4762	.4002
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28294598	.5238	.4003
15	3.64470113	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00666882	.28348640	.5714	.4018
16	3.84009289	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28441582	.6190	.4045
17	4.03548465	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28553254	.6667	.4076
18	4.23087641	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28669701	.7143	.4110
19	4.42626817	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28785291	.7619	.4143
20	4.62165993	4.65177E-02	1.11421E-01	[illegible]	[illegible]	[illegible]	[illegible]	.28896220	.8095	.4175
21	4.81705169	4.77991E-02	[illegible]	.75894619	[illegible]	[illegible]	[illegible]	[illegible]	.8571	.4206
22	5.01244345	4.90030E-02	1.15692E-01	[illegible]	[illegible]	[illegible]	[illegible]	.29104654	.9048	.4235
23	5.20783521	5.02803E-02	1.17868E-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.4266
24	[illegible]	5.13163E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.29291635	1.0000	.4290

K= 5   PHI = 20.0   Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT

3	1.30000000	3.91971E-02	9.41787E-02	.76090166	-.00000000	.06942891	.06846347	.28851630	0.0000	.4162
4	1.49840691	3.98241E-02	9.77825E-02	.76667326	-.02459755	.0658[illegible]	.03172962	.28540213	.0476	.4073
5	1.69681382	3.97252E-02	9.82662E-02	.76848883	-.04027704	.05950761	.02233677	.28434540	.0952	.4043
6	1.89522072	3.95894E-02	9.82520E-02	.76897175	-.05156592	.05554281	.01911395	.28387938	.1429	.4029
7	2.09362763	3.94734E-02	9.82624E-02	.76951289	-.05991601	.05274557	.01605975	.28345101	.1905	.4017
8	2.29203454	3.93910E-02	9.82737E-02	.76960497	-.06626777	.05067954	.01406654	.28316481	.2381	.4009
9	2.49044145	3.93278E-02	9.84626E-02	.76961198	-.07105489	.04904485	.01233352	.28292469	.2857	.4002
10	2.68884836	3.93616E-02	9.84192E-02	.76954905	-.07466107	.0478[illegible]	.01096769	.28282161	.3333	.3999
11	2.88725527	3.94728E-02	9.86097E-02	.76957514	-.0770[illegible]45	.04683582	.00979661	.28281708	.3810	.3999
12	3.08566217	3.94545E-02	9.87367E-02	.76937349	-.07970413	.04601933	.00881143	.28265888	.4286	.3996
13	3.28406908	3.93479E-02	9.86066E-02	.76949589	-.08275368	.04535466	.00794879	.28250246	.4762	.3990
14	3.48247599	3.95152E-02	9.89551E-02	.76915103	-.08351272	.04471514	.00720534	.28254679	.5238	.3993
15	3.68088290	4.01571E-02	1.00156E-01	.76837348	-.08175721	.04409751	.00656692	.28318587	.5714	.4010
16	3.87928981	4.11929E-02	1.02[illegible]E-01	.76695012	-.07811947	.0434[illegible]	.00600325	.28414851	.6190	.4037
17	4.07769672	4.24[illegible]E-02	1.04[illegible]E-01	.76533787	-.07447381	.042[illegible]	.00548473	.28528533	.6667	.4069
18	4.27610362	4.36[illegible]E-02	1.06[illegible]E-01	.76338511	-.06962158	.042[illegible]	.00501120	.28646220	.7143	.4103
19	4.47451053	4.50075E-02	1.08754E-01	.76191408	-.065[illegible]47	.04164937	.00458281	.28762795	.7619	.4136
20	4.67291744	4.62846E-02	1.11030E-01	.76007165	-.06109137	.04115958	.00419317	.28874433	.8095	.4169
21	4.87132435	4.75707E-02	1.13253E-01	.75852244	-.05704906	.04066154	.00384530	.28984103	.8571	.4200
22	5.06973126	4.87710E-02	1.15313E-01	.75668865	-.05346744	.04025137	.00352321	.29094125	.9048	.4229
23	5.26813817	5.00654E-02	1.17515E-01	.75492932	-.04979680	.03982220	.00324610	.29190275	.9524	.4260
24	5.46654507	5.10873E-02	1.19246E-01	.75353836	-.04688622	.03953827	.00297066	.29271773	1.0000	.4284

K= 6 PHI = 30.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.68224E-02	9.00651E-02	.76185008	-.00000000	.10364429	.06846347	.28595186	0.0000	.4088
4	1.50341872	3.79502E-02	9.45096E-02	.76702504	-.02256459	.09787338	.03132834	.28340322	.0476	.4016
5	1.70691745	3.82102E-02	9.55875E-02	.76881728	-.03682423	.08844971	.02214485	.28275086	.0952	.3997
6	1.91037617	3.83219E-02	9.60051E-02	.76929364	-.04721170	.08441562	.01696394	.28254767	.1429	.3992
7	2.11383489	3.83876E-02	9.63445E-02	.76967629	-.05483745	.07816[illegible]	.01592047	.28230555	.1905	.3985
8	2.31729362	3.84322E-02	9.65498E-02	.76983306	-.06[illegible]	.07501[illegible]	.01391555	.28215450	.2381	.3981
9	2.52075234	3.84725E-02	9.67421E-02	.76994236	-.06512[illegible]33	.07256681	.01217298	.28202101	.2857	.3977
10	2.72421106	3.85544E-02	9.70571E-02	.76988824	[illegible]	[illegible]	.010[illegible]	.28201076	.3333	.3977
11	2.92766978	3.87616E-02	9.74385E-02	.76970393	-.07[illegible]76	[illegible]	.00962105	.28206573	.3810	.3978
12	3.13112851	3.87737E-02	9.75294E-02	.76973955	-.07505[illegible]2	[illegible]	.00862897	.28197839	.4286	.3976
13	3.33458723	3.87188E-02	9.74[illegible]E-02	.76948175	-.07547[illegible]30	[illegible]	.00776413	.28193426	.4762	.3972
14	3.53804595	3.8[illegible]40E-02	9.79833E-02	.76955814	-.0766[illegible]	[illegible]	.00702[illegible]	.28201416	.5238	.3977
15	3.74150468	3.96797E-02	9.93104E-02	.76819767	-.07415[illegible]23	[illegible]	[illegible]	.28268452	.5714	.3976
16	3.94496340	4.07478E-02	1.01254E-01	.76714714	-.07052[illegible]71	[illegible]	.00582544	.28370176	.6190	.4024
17	4.14842212	4.19920E-02	1.03492E-01	.76544781	-.06615[illegible]51	[illegible]	.00530707	.28487121	.6667	.4058
18	4.35188085	4.32948E-02	1.05810E-01	.76366[illegible]01	[illegible]	[illegible]	.00485497	.28606851	.7143	.4092
19	4.55533957	4.46006E-02	1.08128E-01	.76185524	-.05[illegible]72	.06113[illegible]	.00440[illegible]	.28725009	.7619	.4126
20	4.75879829	4.58[illegible]E-02	1.10578E-01	.760[illegible]98	-.05507[illegible]14	[illegible]	.00[illegible]2312	.28837919	.8095	.4159
21	4.96225702	4.71[illegible]E-02	1.12615E-01	.758[illegible]96	-.04900191	.059[illegible]	.00367952	.28948993	.8571	.4190
22	5.16571574	4.83904E-02	1.14684E-01	.75604040	-.04541000	.05[illegible]610	.00336118	.29049528	.9048	.4219
23	5.36917446	4.96976E-02	1.16911E-01	.75483640	-.04149745	.05835[illegible]8	.00308340	.29157932	.9524	.4251
24	5.57263319	5.07121E-02	1.18633E-01	.75343661	-.03880598	.05794253	.00281671	.29239358	1.0000	.4275

K= 7 PHI = 40.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.37690E-02	8.46632E-02	.76304439	-.00000000	.13752028	.06846347	.28243634	0.0000	.3989
4	1.51056585	3.55413E-02	9.01595E-02	.76743403	-.01947[illegible]2	.12838[illegible]	.03096364	.28072396	.0476	.3940
5	1.72113170	3.62544E-02	9.20402E-02	.76924811	-.03187[illegible]8	.116[illegible]47	.02193357	.28061596	.0952	.3937
6	1.93169755	3.66777E-02	9.30566E-02	.76974509	-.0406[illegible]41	.108[illegible]	.01978075	.28076477	.1429	.3941
7	2.14226340	3.69615E-02	9.37805E-02	.77012567	-.04771539	.10[illegible]	.01575509	.28077457	.1905	.3942
8	2.35282925	3.71807E-02	9.43060E-02	.77069165	-.0[illegible]30	.09798978	.01372835	.28080442	.2381	.3943
9	2.56339510	3.73535E-02	9.47384E-02	.77064472	-.05[illegible]69	[illegible]	.01197255	.28081482	.2857	.3943
10	2.77396095	3.75897E-02	9.52594E-02	.77051560	-.05[illegible]50	[illegible]	.01058650	.28092822	.3333	.3946
11	2.98452680	3.78232E-02	9.57631E-02	.77017194	-.06146[illegible]71	[illegible]	.00[illegible]3344	.28105711	.3810	.3950
12	3.19509265	3.79742E-02	9.59243E-02	.77025956	-.06[illegible]29	[illegible]	.00859076	.28101062	.4286	.3948
13	3.40565850	3.78930E-02	9.60172E-02	.77037207	-.066[illegible]56	.0857[illegible]3	.00752124	.28094286	.4762	.3946
14	3.61622435	3.82438E-02	9.67026E-02	.76997577	-.066[illegible]23	.08[illegible]6	.00678585	.28123942	.5238	.3955

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
15	3.82679020	3.90487E-02	9.81964E-02	.76890641	-.05374732	.08402545	.00615391	.28201381	.5714	.3977
16	4.03735605	4.01692E-02	1.00242E-01	.76737155	-.05386702	.08366753	.00558487	.28329836	.6190	.4007
17	4.24792150	4.14392E-02	1.02[illegible]E-01	.76561170	-.05537465	.08135376	.00[illegible]615	.28430737	.6667	.4042
18	4.45948775	4.27528E-02	1.04[illegible]E-01	.76377960	-.05[illegible]1113	.08013710	.00459605	.28552978	.7143	.4076
19	4.66905360	4.40739E-02	1.07217E-01	.76192881	-.04636450	.07900607	.00417443	.28673068	.7619	.4111
20	4.87561945	4.53646E-02	1.09481E-01	.76011592	-.04215 98	.07794112	.00379313	.28787619	.8095	.4144
21	5.09018550	4.66620E-02	1.11735E-01	.75819940	-.03962473	.07701892	.00345566	.28900340	.8571	.4176
22	5.30075115	4.78877E-02	1.13815E-01	.75659193	-.03447747	.07618142	.00314337	.29002616	.9048	.4206
23	5.51131700	4.91842E-02	1.16004E-01	.7547[illegible]92	-.03051139	.07552129	.00287856	.29112501	.9524	.4238
24	5.72168285	5.01956E-02	1.17786E-01	.75331136	-.02783759	.07473256	.00261181	.29194490	1.0000	.4262

K= 8 PHI = 50.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.02229E-02	7.82146E-02	.76452152	.00000000	.17057897	.04846347	.27799640	0.0000	.3864
4	1.51977340	3.27265E-02	8.50049E-02	.76803968	-.01552557	.15857250	.03051945	.27739093	.0476	.3847
5	1.73954680	3.39489E-02	8.78726E-02	.76944821	-.02557225	.14218492	.02174472	.27797499	.0952	.3864
6	1.95932020	3.47297E-02	8.95393E-02	.77034404	-.03372465	.13215441	.01841839	.27856822	.1429	.3886
7	2.17909360	3.52759E-02	9.07093E-02	.77072523	-.03882530	.12481417	.01558744	.27888786	.1905	.3889
8	2.39886701	3.56797E-02	9.15536E-02	.77091366	-.04322432	.11930706	.01355050	.27913656	.2381	.3896
9	2.61864041	3.60082E-02	9.23026E-02	.77163500	-.04657112	.11502458	.01174729	.27932426	.2857	.3901
10	2.83841381	3.63714E-02	9.30306E-02	.77092180	-.04871672	.11164413	.01033558	.27958396	.3333	.3908
11	3.05818721	3.66736E-02	9.36546E-02	.77082371	-.04946449	.10892530	.00911288	.27979257	.3810	.3914
12	3.27796061	3.67728E-02	9.35436E-02	.77097743	-.04773449	.10668145	.00805017	.27979833	.4286	.3914
13	3.49773401	3.68894E-02	9.42151E-02	.77105650	-.04435181	.10475460	.00721508	.27983731	.4762	.3915
14	3.71750741	3.73057E-02	9.51354E-02	.77043279	-.05373451	.10291767	.00647505	.2802[illegible]	.5238	.3928
15	3.93728081	3.82737E-02	9.69217E-02	.76932914	-.05097427	.10117482	.00584476	.2811	.5714	.3953
16	4.15705421	3.94432E-02	9.85769E-02	.76769472	-.04677165	.09943779	.00527337	.28233[illegible]2	.6190	.3986
17	4.37682761	4.07441E-02	1.01324E-01	.76585327	-.04214450	.09778153	.00475590	.28358974	.6667	.4021
18	4.59660102	4.20685E-02	1.03701E-01	.76397347	-.03752510	.09624775	.00429049	.28484128	.7143	.4057
19	4.81637442	4.33950E-02	1.06057E-01	.76206935	-.03305490	.09483116	.00387613	.28606504	.7619	.4092
20	5.03614782	4.46902E-02	1.08338E-01	.76023414	-.02881431	.09354413	.00350362	.28723117	.8095	.4125
21	5.25592122	4.59913E-02	1.10607E-01	.75837414	-.02468464	.09234360	.00317590	.28837745	.8571	.4158
22	5.47569462	4.72023E-02	1.12704E-01	.75657487	-.02135461	.09129440	.00287362	.28941893	.9048	.4188
23	5.69546802	4.85235E-02	1.14960E-01	.75466038	-.01724118	.09022733	.00261985	.29053617	.9524	.4221
24	5.91524142	4.95330E-02	1.16704E-01	.75319658	-.01413912	.08947450	.00236318	.29137042	1.0000	.4245

K= 9 PHI = 60.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	2.63906E-02	7.09947E-02	.76609539	.00000000	.20339922	.06846347	.27266339	0.0000	.3717
4	1.53103410	2.96699E-02	7.93224E-02	.76871075	-.01073115	.18088211	.04050680	[illegible]351129	.0476	.3740
5	1.76206821	3.14322E-02	8.31725E-02	.77034974	-.01824495	.16756481	.02115356	[illegible]492417	.0952	.3779
6	1.99310231	3.25[illegible]E-02	8.55444E-02	.77104704	-.02402414	.15448749	.01944505	[illegible]603149	.1429	.3810
7	2.22413642	3.34044E-02	8.72576E-02	.77111685	-.02852123	.14559182	.01537767	.27670367	.1905	.3828
8	2.45517052	3.40045E-02	8.85097E-02	.77173702	-.03209431	.13886792	.01324737	.27719719	.2381	.3842
9	2.68620462	3.44569E-02	8.95402E-02	.77186182	-.03470193	.13326786	.01140729	.27758482	.2857	.3853
10	2.91723873	3.45875E-02	9.05424E-02	.77175310	-.03625842	.12902856	.00994742	.27800042	.3333	.3864
11	3.14827283	3.53464E-02	9.12865E-02	.77173178	-.03778857	.12569412	.00869479	.27828154	.3810	.3872
12	3.37930693	3.54978E-02	9.16333E-02	.77196252	-.03982133	.12287677	.00765867	.27834841	.4286	.3874
13	3.61034104	3.57350E-02	9.21278E-02	.77197383	-.04094793	.12042102	.00678619	.27852664	.4762	.3879
14	3.84137514	3.63604E-02	9.33046E-02	.77127872	-.03952414	.11815794	.00606442	.27914581	.5238	.3896
15	4.07240925	3.75534E-02	9.52095E-02	.76991523	-.03612032	.11559490	.00543631	.28017662	.5714	.3925
16	4.30344335	3.85966E-02	9.74759E-02	.76811597	-.03160145	.11374158	.00487131	.28141825	.6190	.3960
17	4.53447745	3.99162E-02	9.98774E-02	.76623148	-.02680548	.11172675	.00436432	.28271972	.6667	.3997
18	4.76551156	4.12457E-02	1.02282E-01	.76423264	-.02220836	.10987053	.00391246	.28400423	.7143	.4033
19	4.99654566	4.25902E-02	1.04658E-01	.76231582	-.01767235	.10816404	.00351334	.28525449	.7619	.4069
20	5.22757977	4.38793E-02	1.06956E-01	.76034378	-.01340750	.10661551	.00315711	.28644534	.8095	.4103
21	5.45861387	4.51827E-02	1.09240E-01	.75844905	-.00924297	.10517578	.00284572	.28761366	.8571	.4136
22	5.68964797	4.63998E-02	1.11357E-01	.75665417	-.00559341	.10391144	.00256019	.28867849	.9048	.4167
23	5.92068208	4.77223E-02	1.13634E-01	.75465213	-.00151853	.10263494	.00232156	.28981512	.9524	.4200
24	6.15171618	4.87459E-02	1.15390E-01	.75313142	.00123531	.10171563	.00208051	.29067008	1.0000	.4224

K=10 PHI = 70.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	2.25779E-02	6.35070E-02	.76773358	.00000000	.23466561	.06846347	.26665272	0.0000	.3555
4	1.54437912	2.46017E-02	7.35660E-02	.76949563	-.01492755	.21275497	.05043307	.26929137	.0476	.3626
5	1.78875825	2.68760E-02	7.87915E-02	.77241085	-.01453873	.18966515	.02160345	.27161208	.0952	.3689
6	2.03313737	3.04[illegible]E-02	8.14131E-02	.77201467	-.01757272	.17429072	.01827715	.27329736	.1429	.3734
7	2.27751649	3.147[illegible]E-02	8.36[illegible]E-02	.77245578	-.01694719	.16541826	.01515532	.27434335	.1905	.3763
8	2.52189562	3.226[illegible]E-02	8.52[illegible]E-02	.77274276	-.01957434	.15519450	.01297215	.27509746	.2381	.3784
9	2.76627474	3.29[illegible]E-02	8.66[illegible]E-02	.77287519	-.0[illegible]57859	.14878757	.01[illegible]978	.27570608	.2857	.3801
10	3.01065386	3.35[illegible]E-02	8.78716E-02	.77278521	-.0[illegible]	.1437[illegible]	.00[illegible]9217	.27627793	.3333	.3816
11	3.25503299	3.393[illegible]E-02	8.87[illegible]E-02	.772[illegible]34	-.0[illegible]	.13[illegible]41	.00821929	.27662221	.3810	.3826
12	3.49941211	3.41[illegible]E-02	8.917[illegible]E-02	.77317549	-.0[illegible]43	.13616876	.00718020	.2767725[illegible]	.4286	.3830
13	3.74379124	3.45[illegible]E-02	8.99[illegible]E-02	.77305750	-.0[illegible]56	.13314537	.00632036	.27712624	.4762	.3840
14	3.98817036	3.53103E-02	9.24[illegible]E-02	.772[illegible]19	-.0[illegible]5543	.12[illegible]	.00[illegible]	.27795424	.5238	.3862
15	4.23254948	3.641[illegible]E-02	9.34[illegible]E-02	.770[illegible]47	-.01[illegible]32	.12[illegible]287	.00448527	.27903524	.5714	.3895
16	4.47692861	3.768[illegible]E-02	9.5[illegible]E-02	.7687[illegible]59	-.01[illegible]55	.12[illegible]67	.00442766	.28041084	.6190	.3932
17	4.72130773	3.[illegible]E-02	9.8[illegible]E-02	.766[illegible]57	-.01[illegible]55	.12[illegible]65	.00[illegible]383	.28175502	.6667	.3969
18	4.96568685	4.034[illegible]E-02	1.00714E-01	.764[illegible]82	-.00[illegible]7319	.12054473	.00349950	.28302996	.7143	.4006
19	5.21006598	4.16785E-02	1.03[illegible]E-01	.76264311	-.00[illegible]37	.11950855	.00311829	.28434328	.7619	.4043
20	5.45444510	4.2976[illegible]E-02	1.05[illegible]E-01	.76064070	.00[illegible]07	.11677425	.00278190	.28555753	.8095	.4077
21	5.69882422	4.4274[illegible]E-02	1.076[illegible]E-01	.75[illegible]83	.00[illegible]315	.11511[illegible]2	.00249024	.28674592	.8571	.4111
22	5.94320335	4.54965E-02	1.09930E-01	.75677465	.01157740	.11344[illegible]	.00222487	.28783439	.9048	.4142
23	6.18758247	4.68135E-02	1.12107E-01	.754[illegible]100	.01562948	.1121[illegible]	.00200463	.28898722	.9524	.4176
24	6.43196159	4.78454E-02	1.13887E-01	.75313060	.01845474	.11109558	.00178301	.28986600	1.0000	.4201

K=11 PHI = 80.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.89419E-02	[illegible]209E-02	.76434810	.00000000	.26440050	.06846347	.26004693	0.0000	.3381
4	1.55463559	2.36311E-02	6.73760E-02	.77059373	.00177126	.23612518	.03126290	.26485289	.0476	.3507
5	1.81927199	2.63917E-02	7.33945E-02	.77258189	.00[illegible]94	.2[illegible]37714	.02196372	.26817426	.0952	.3596
6	2.07890768	2.826[illegible]E-02	7.72[illegible]E-02	.773[illegible]14	-.00[illegible]21	.19125972	.01830092	.27046405	.1429	.3658
7	2.33854397	2.92[illegible]E-02	8.00[illegible]E-02	.7736[illegible]02	-.00[illegible]748	.17833739	.01491172	.27189924	.1905	.3696
8	2.59617997	3.0[illegible]E-02	8.2[illegible]E-02	.7746[illegible]	-.00[illegible]90	.16[illegible]	.01[illegible]7144	.27291890	.2381	.3724
9	2.85781596	3.13[illegible]E-02	8.371[illegible]E-02	.77418527	-.00[illegible]47	.16[illegible]75	.01049169	.27375075	.2857	.3747
10	3.11745145	3.20[illegible]E-02	8.51[illegible]E-02	.77434133	-.00[illegible]1	.15[illegible]47	.00[illegible]970	.27444939	.3333	.3766
11	3.37708795	3.24[illegible]E-02	8.6[illegible]E-02	.7745[illegible]78	-.00[illegible]315	.15[illegible]	.00761329	.27483787	.3810	.3777
12	3.63672394	3.2777[illegible]E-02	8.6[illegible]E-02	.77470858	-.01[illegible]95	.14613450	.00657561	.27508931	.4286	.3784
13	3.89635993	3.3[illegible]E-02	8.76707E-02	.77441773	-.00[illegible]8215	.14255005	.00575244	.27563264	.4762	.3799
14	4.15599593	3.42057E-02	8.94[illegible]E-02	.77324623	-.00656115	.13[illegible]1210	.00[illegible]511	.27661868	.5238	.3826
15	4.41563192	3.5578[illegible]E-02	9.16298E-02	.77154491	-.00[illegible]46	.13[illegible]77	.004[illegible]59	.27789797	.5714	.3861
16	4.67526791	3.6674[illegible]E-02	9.4[illegible]E-02	.76961233	.00[illegible]19	.13314119	.00[illegible]82	.27927167	.61.0	.3900
17	4.93490391	3.80[illegible]E-02	9.65074E-02	.767[illegible]14	.00[illegible]2	.13045749	.00[illegible]03	.28065376	.6667	.3938
18	5.19453[illegible]	3.935[illegible]E-02	9.89[illegible]E-02	.765[illegible]75	.01[illegible]75	.12[illegible]	.00[illegible]131	.28199737	.7143	.3976
19	5.45417589	4.06[illegible]E-02	1.013[illegible]E-01	.76[illegible]66	.01[illegible]6	.12[illegible]11	.00[illegible]7247	.28329769	.7619	.4013
20	5.71381189	4.1957[illegible]E-02	1.036[illegible]E-01	.76115106	.02156472	.1237[illegible]1	.00[illegible]6668	.28453854	.8095	.4048
21	5.97344788	4.32[illegible]E-02	1.05[illegible]E-01	.75[illegible]192	.02[illegible]335	.1[illegible]430	.00210361	.28574924	.8571	.4083
22	6.23308387	4.447[illegible]E-02	1.08[illegible]E-01	.75711095	.02[illegible]251	.1[illegible]19575	.00188637	.28686492	.9048	.4115
23	6.49271987	4.57825E-02	1.10367E-01	.75497594	.033[illegible]56	.11054818	.00167036	.28803497	.9524	.4148
24	6.75235586	4.68188E-02	1.12161E-01	.75330904	.03661747	.11730592	.00147426	.28893734	1.0000	.4174

K=12 PHI = 90.0 Z = 15.592105

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.55955E-02	4.87581E-02	.77102290	.00000000	.29269[illegible]	.06846347	.25292451	0.0000	.3199
4	1.57675636	2.08705E-02	6.15755E-02	.77151468	.00[illegible]1246	.2[illegible]3523	.03326570	.26036127	.0476	.3389
5	1.85351271	2.40[illegible]E-02	6.874[illegible]E-02	.7736[illegible]539	.01[illegible]614	.2[illegible]46099	.0[illegible]54697	.26476791	.0952	.3505
6	2.1[illegible]026907	2.62937E-02	7.33[illegible]37E-02	.77452342	.00[illegible]5179	.2[illegible]4789	.01826357	.26767900	.1429	.3583
7	2.40702543	2.7822[illegible]E-02	7.661[illegible]E-02	.7751[illegible]6	.00[illegible]118	.1[illegible]17	.01462191	.26949715	.1905	.3631
8	2.68378179	2.891[illegible]E-02	7.8977[illegible]E-02	.775[illegible]150	.00[illegible]545	.17815[illegible]7	.012[illegible]05	.27078973	.2381	.3666
9	2.96053814	2.99[illegible]E-02	8.0[illegible]81E-02	.775[illegible]32	.00[illegible]774	.16[illegible]68	.00[illegible]7795	.27183261	.2857	.3695
10	3.23729450	3.06363E-02	8.2[illegible]E-02	.7757[illegible]05	.00[illegible]	.1[illegible]	.00[illegible]3489	.27261894	.3333	.3716
11	3.51405086	3.107[illegible]E-02	8.335[illegible]E-02	.776[illegible]98	.00[illegible]7	.15[illegible]3	.00[illegible]455	.27304137	.3810	.3728
12	3.79080722	3.14575E-02	8.4157[illegible]E-02	.77[illegible]775	.00[illegible]76	.15[illegible]6	.00597669	.27342060	.4286	.3738
13	4.06756357	3.2127[illegible]E-02	8.54[illegible]E-02	.77595041	.00[illegible]2073	.14837[illegible]	.00514512	.27416350	.4762	.3758

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
14	4.34431993	3.31396E-02	8.74427E-02	.77456646	.01126563	.14452112	.00445541	.27531328	.5238	.3790
15	4.62107629	3.43[illegible]E-02	8.97757E-02	.772[illegible]2768	.016[illegible]	.14[illegible]	.00385440	.27669425	.5714	.3828
16	4.89783164	3.56727E-02	9.22[illegible]E-02	.770[illegible]2418	.0211[illegible]	.13[illegible]	.00354758	.27811540	.6190	.3867
17	5.17458[illegible]	3.70024E-02	9.47[illegible]E-02	.768[illegible]	.027[illegible]883	.13[illegible]	.00291168	.27955[illegible]07	.6667	.3907
18	5.45134536	3.83[illegible]E-02	9.71444E-02	.766[illegible]	.03111685	.131[illegible]	.0025[illegible]79	.28089933	.7143	.3945
19	5.72810172	3.96354E-02	9.95271E-02	.764[illegible]	.035[illegible]8118	.12[illegible]	.0022[illegible]	.28221888	.7619	.3982
20	6.00485807	4.09191E-02	1.0[illegible]E-01	.761[illegible]	.040[illegible]	.12[illegible]83	.00195033	.28347927	.8095	.4018
21	6.28161443	4.21976E-02	1.04119E-01	.75965539	.044[illegible]	.12[illegible]	.00171943	.28470431	.8571	.4053
22	6.55837079	4.34106E-02	1.06[illegible]E-01	.7575[illegible]	.0485[illegible]	.12[illegible]	.00151379	.28583860	.9048	.4085
23	6.83512715	4.46[illegible]E-02	1.08521E-01	.7553[illegible]	.0525[illegible]	.12155156	.00134533	.28701835	.9524	.4119
24	7.11188350	4.57241E-02	1.10305E-01	.75364097	.05529617	.12017798	.00118349	.28793224	1.0000	.4145

K=13 PHI =100.0 Z = 15.592163

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.28742E-02	4.23518E-02	.77240958	.00000000	.31789178	.06946547	.24589859	0.0000	.3023
4	1.59517076	1.85724E-02	5.652[illegible]E-02	.7727[illegible]880	.01[illegible]	.2721[illegible]307	.03676257	.25635102	.0476	.3286
5	1.89034153	2.22165E-02	6.48211E-02	.7756[illegible]85	.02[illegible]	.2[illegible]013	.023[illegible]533	.26181528	.0952	.3427
6	2.18551229	2.46915E-02	7.[illegible]E-02	.77612439	.021[illegible]	.21[illegible]	.01648784	.26530532	.1429	.3519
7	2.480[illegible]306	2.63747E-02	7.37[illegible]E-02	.77661[illegible]4	.021[illegible]46	.19[illegible]45	.014[illegible]50	.26743577	.1905	.3576
8	2.775[illegible]2	2.76217E-02	7.63[illegible]E-02	.7774[illegible]	[illegible]	.18[illegible]9	.01167[illegible]31	.26932981	.2381	.3616
9	3.0710[illegible]59	2.865[illegible]E-02	7.8[illegible]E-02	.77761441	.02[illegible]517	.17[illegible]17	.00[illegible]4822	.27012481	.2857	.3648
10	3.36619[illegible]5	2.9[illegible]E-02	8.[illegible]E-02	.777[illegible]550	.02[illegible]55	.16[illegible]73	.00[illegible]8104	.27089595	.3333	.3669
11	3.66176612	2.978[illegible]E-02	8.[illegible]E-02	.778[illegible]115	.022[illegible]128	.154[illegible]325	.00[illegible]82	.27132499	.3810	.3681
12	3.95653[illegible]8	3.02[illegible]E-02	8.1[illegible]E-02	.7786[illegible]9	.02[illegible]28	.154[illegible]	.00519130	.27185207	.4286	.3695
13	4.25170765	3.10[illegible]E-02	8.3[illegible]E-02	.77785198	.024[illegible]	.14[illegible]408	.00439222	.27274468	.4762	.3719
14	4.54687841	3.21[illegible]E-02	8.55[illegible]E-02	.77625963	.025[illegible]83	.14[illegible]57	.003[illegible]44	.27401547	.5238	.3754
15	4.84204918	3.33[illegible]E-02	8.795[illegible]E-02	.77428339	.03415987	.141[illegible]26	.00316450	.27544779	.5714	.3794
16	5.13721994	3.46[illegible]E-02	9.03[illegible]E-02	.7720[illegible]80	.03537[illegible]9	.13[illegible]57	.002[illegible]52	.27690788	.6190	.3834
17	5.43239071	3.5[illegible]E-02	9.2[illegible]E-02	.76[illegible]170	.044[illegible]85	.13454356	.00[illegible]18	.27833582	.6667	.3874
18	5.72756147	3.7[illegible]E-02	9.5[illegible]E-02	.7674[illegible]2	.04[illegible]	.131[illegible]4	.00[illegible]77	.27972157	.7143	.3912
19	6.02273224	3.8[illegible]E-02	9.7[illegible]E-02	.765[illegible]88	.054[illegible]0	.129[illegible]70	.00175[illegible]88	.28101652	.7619	.3950
20	6.31790[illegible]0	3.98[illegible]E-02	9.9[illegible]E-02	.762[illegible]60	.058[illegible]6	.12[illegible]28	.00151508	.2823[illegible]20	.8095	.3986
21	6.61307377	4.10758E-02	1.02[illegible]E-01	.760[illegible]4	.06281[illegible]5	.12[illegible]1710	.00132670	.28357067	.8571	.4021
22	6.90824453	4.22658E-02	1.04[illegible]E-01	.7581[illegible]60	.066[illegible]100	.12[illegible]76	.00116233	.28471347	.9048	.4053
23	7.20341529	4.33491E-02	1.06[illegible]E-01	.7560[illegible]5	.07[illegible]78	.12[illegible]133	.00103367	.28591946	.9524	.4087
24	7.49858606	4.45179E-02	1.08240E-01	.75432085	.07358959	.11[illegible]8	.00089866	.28680581	1.0000	.4113

K=14 PHI =110.0 Z = 15.592163

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.10988E-02	3.82412E-02	.7710[illegible]	.00000000	.33[illegible]934	.068[illegible]347	.24092833	0.0000	.2902
4	1.614[illegible]	1.7[illegible]E-02	5.31311E-02	.774[illegible]18	.0[illegible]	.27[illegible]	.03[illegible]50	.25363[illegible]	.0476	.3217
5	1.9293[illegible]8	2.10112E-02	6.2[illegible]E-02	.7777[illegible]58	.0[illegible]33	.2[illegible]254	.02[illegible]84	.25982060	.0952	.3375
6	2.24[illegible]	2.36112E-02	6.79[illegible]E-02	.778[illegible]46	.0[illegible]	.215[illegible]	.0183[illegible]34	.26360287	.1429	.3474
7	2.55961735	2.53[illegible]E-02	7.17[illegible]E-02	.7794[illegible]80	.0[illegible]	.19[illegible]29	.01789[illegible]6	.26588605	.1905	.3535
8	2.87527169	2.6[illegible]E-02	7.45[illegible]E-02	.779[illegible]2	.0[illegible]11	.1[illegible]	.0107[illegible]35	.26748659	.2381	.3577
9	3.1[illegible]	2.767[illegible]E-02	7.66[illegible]E-02	.779[illegible]	.0[illegible]612	.1[illegible]64	.00[illegible]75	.26858244	.2857	.3610
10	3.50[illegible]37	2.8[illegible]E-02	7.8[illegible]E-02	.7804[illegible]15	.0[illegible]52	.1[illegible]	.0045[illegible]	.2694[illegible]7	.3333	.3629
11	3.81[illegible]71	2.87[illegible]E-02	7.89[illegible]E-02	.781[illegible]69	.07711[illegible]0	.15[illegible]	.00[illegible]26	.26983196	.3810	.3640
12	4.131[illegible]	2.9[illegible]E-02	8.0[illegible]E-02	.78[illegible]	.0[illegible]	.15[illegible]	.00431216	.27046539	.4286	.3658
13	4.44[illegible]	3.0139[illegible]E-02	8.17[illegible]E-02	.779[illegible]75	.0[illegible]	.1[illegible]	.00[illegible]41	.27112257	.4762	.3686
14	4.76110773	3.1[illegible]E-02	8.3[illegible]E-02	.778[illegible]	.04831351	.14[illegible]	.00[illegible]67	.27287515	.5238	.3723
15	5.07[illegible]06	3.2[illegible]E-02	8.6[illegible]E-02	.7758[illegible]15	.05164125	.13[illegible]	.0025[illegible]7	.2743[illegible]4	.5714	.3763
16	5.3[illegible]0	3.375[illegible]E-02	8.87[illegible]E-02	.77[illegible]1	.0[illegible]	.13[illegible]	.00213590	.27580450	.6190	.3803
17	5.7[illegible]4	3.5[illegible]E-02	9.117[illegible]E-02	.77[illegible]3	.06216864	.1[illegible]72	.00181721	.27723600	.6667	.3843
18	6.01[illegible]	3.6[illegible]E-02	9.3[illegible]E-02	.769[illegible]65	.0[illegible]85	.1[illegible]	.00155[illegible]7	.27861693	.7143	.3881
19	6.33[illegible]	3.7[illegible]E-02	9.5[illegible]E-02	.76[illegible]	.0[illegible]	[illegible]	.0013[illegible]0	.27993[illegible]6	.7619	.3919
20	6.6[illegible]376	3.877[illegible]E-02	9.[illegible]E-02	.76[illegible]	.0[illegible]	.1[illegible]	.00[illegible]	.2812[illegible]52	.8095	.3954
21	6.9[illegible]	[illegible]	1.0[illegible]E-01	.761[illegible]	.0[illegible]11	.1[illegible]	.001[illegible]77	.28[illegible]33	.8571	.3989
22	7.27[illegible]	4.11611E-02	1.0[illegible]E-01	.7593[illegible]	.0[illegible]111	.11[illegible]	.00[illegible]	.2838[illegible]35	.9048	.4022
23	7.59306677	4.24[illegible]E-02	1.04[illegible]E-01	.75[illegible]169	.0[illegible]12	.116[illegible]	.00[illegible]57	.28481154	.9524	.4056
24	7.90774111	4.35[illegible]E-02	1.06218E-01	.75515726	.0[illegible]	.115[illegible]60	.000[illegible]36	.28569278	1.0000	.4081

K=15 PHI =120.0 Z = 15.592163

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.15453E-02	3.93338E-02	.78142412	.00000000	[illegible]	.06846347	.24222969	0.0000	.2935
4	1.63431013	1.73042E-02	5.34471E-02	.77819194	.02428132	[illegible]	.04387917	.25446503	.0476	.3238
5	1.96862025	2.12061E-02	6.25[illegible]E-02	.78005470	.03500411	[illegible]	.02635976	.26033141	.0952	.3389
6	2.30293038	2.36314E-02	6.798[illegible]E-02	.78100443	.04159420	[illegible]	.01806553	.26366443	.1429	.3476
7	2.63724051	2.52768E-02	7.1512[illegible]E-02	.78178474	[illegible]	.18779574	.01318056	.26566889	.1905	.3529
8	2.97155064	2.64044E-02	7.40521E-02	.78210121	[illegible]	.17201593	.01011426	.26706607	.2381	.3566
9	3.30586076	2.72537E-02	7.58751E-02	.78275428	.05269185	.16170146	.00780597	.26903046	.2857	.3592
10	3.64017089	2.77155E-02	7.68[illegible]E-02	.78513616	[illegible]	.15415182	.0063[illegible]568	.26852847	.3333	.3605
11	3.97448102	2.80443E-02	7.7605[illegible]E-02	[illegible]	.05517232	.14[illegible]151	.00483031	.26954180	.3810	.3614
12	4.30879115	2.83[illegible]E-02	7.874[illegible]E-02	[illegible]	.05932104	.14[illegible]196	.00537663	.26950558	.4286	.3632
13	4.64310127	2.94[illegible]E-02	8.0[illegible]E-02	[illegible]	.05715[illegible]	.137[illegible]	[illegible]	.27060077	.4762	.3661
14	4.97741140	3.05[illegible]E-02	8.263[illegible]E-02	.78007410	[illegible]	.134[illegible]27	.00[illegible]231	.27195139	.5238	.3698
15	5.31172153	3.17374E-02	8.442[illegible]E-02	.77775445	[illegible]	[illegible]	[illegible]	.27338717	.5714	.3737
16	5.64603166	3.29506E-02	8.72[illegible]E-02	.77531197	.07333193	.12[illegible]1422	.00173787	.27482147	.6190	.3776
17	5.98034178	3.41694E-02	8.95667E-02	.77291317	.078[illegible]52	.122[illegible]	.00145593	.27622338	.6667	.3815
18	6.31465191	3.53828E-02	9.18422E-02	.77033460	[illegible]	.11[illegible]704	.00172617	.27758100	.7143	.3853
19	6.64896204	3.65897E-02	9.40818E-02	.76773801	.0[illegible]402	.11733580	.00103977	.27889563	.7619	.3889
20	6.98327217	3.77781E-02	9.62651E-02	.76532661	[illegible]	.11[illegible]549	.00[illegible]273	.28015636	.8095	.3924
21	7.31758229	3.89634E-02	9.84[illegible]E-02	.76287006	.09718117	.112[illegible]721	.00075582	.28139172	.8571	.3959
22	7.65189242	4.00894E-02	1.00[illegible]E-01	.76054714	.10102451	.11076654	.00[illegible]547	.28251917	.9048	.3991
23	7.98620255	4.12807E-02	1.02[illegible]E-01	.75806109	.10510455	.1084664[illegible]	.000[illegible]231	.28370376	.9524	.4024
24	8.32051268	4.21793E-02	1.04173E-01	.75628740	.10777039	.10743645	.00047363	.28456013	1.0000	.4049

K=16 PHI =130.0 Z = 15.592133

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	1.60755E-02	4.98254E-02	.78819182	.00000000	.2364[illegible]060	.06846347	.25402224	0.0000	.3226
4	1.65342133	2.01272E-02	5.91620E-02	[illegible]	[illegible]	[illegible]	.05[illegible]871	.26081927	.0476	.3401
5	2.00684266	2.34961E-02	6.71041E-02	.78127736	.04[illegible]909	.19413573	.03120209	.26463068	.0952	.3501
6	2.36026399	2.50537E-02	7.07975E-02	.78250862	[illegible]	.17877655	.02038910	.26603681	.1429	.3539
7	2.71368531	2.61634E-02	7.335[illegible]E-02	.78348759	.06161586	.162[illegible]967	.01407763	.26708823	.1905	.3567
8	3.06710664	2.69505E-02	7.5166[illegible]E-02	.7835[illegible]55	[illegible]	.15[illegible]518	.00985470	.2678[illegible]589	.2391	.3587
9	3.42052797	2.74472E-02	7.626[illegible]E-02	.78443172	[illegible]	.144[illegible]794	.00701442	.26824472	.2857	.3598
10	3.77394930	2.76095E-02	7.67119E-02	.78543472	.06311169	.138[illegible]194	.00518145	.26829504	.3333	.3599
11	4.12737063	2.77670E-02	7.71314E-02	.78607547	.0637[illegible]45	.135[illegible]861	.00395464	.26842317	.3810	.3603
12	4.48079195	2.82[illegible]E-02	7.8157[illegible]E-02	.78501612	.06647582	.1[illegible]2107	.00311297	.26902264	.4286	.3619
13	4.83421328	2.91045E-02	7.9[illegible]E-02	.78412126	.07[illegible]77	.1[illegible]17375	.00[illegible]131	.27006914	.4762	.3647
14	5.18763461	3.01197E-02	8.1[illegible]E-02	[illegible]795	[illegible]	[illegible]	[illegible]	.27135101	.5238	.3682
15	5.54105594	3.1[illegible]E-02	8.3[illegible]E-02	.77661105	[illegible]	.116[illegible]17	.0017[illegible]95	.27270922	.5714	.3719
16	5.89447727	3.23[illegible]E-02	8.61[illegible]E-02	.77[illegible]778	[illegible]	.113[illegible]	.00143245	.27408929	.6190	.3756
17	6.24789860	3.34[illegible]E-02	8.85[illegible]E-02	.7741[illegible]845	[illegible]35	.110[illegible]72	.00119667	.27540489	.6667	.3792
18	6.60131992	3.46277E-02	9.04[illegible]E-02	.77197077	[illegible]	.10775765	.001[illegible]27	.27670482	.7143	.3828
19	6.95474125	3.57676E-02	9.25727E-02	.76940980	.10267870	.10573127	.00[illegible]353	.27796757	.7619	.3863
20	7.30816258	3.68863E-02	9.46481E-02	.76688714	.10739939	.10311757	.00070269	.27918391	.8095	.3897
21	7.66158391	3.80043E-02	9.66[illegible]E-02	.76430414	.11160[illegible]2	[illegible]	.00058716	.28036580	.8571	.3930
22	8.01[illegible]24	3.90757E-02	9.8[illegible]E-02	.76200519	.115[illegible]76	[illegible]83	.00048491	.28147125	.9048	.3961
23	8.36842657	4.0[illegible]84E-02	1.00[illegible]E-01	.759[illegible]	.11953[illegible]83	[illegible]	.00040490	.28261449	.9524	.3994
24	8.72184769	4.10361E-02	1.02166E-01	.75775825	.12[illegible]221	.096[illegible]61	.00032140	.2834[illegible]992	1.0000	.4017

K=17 PHI =140.0 Z = 15.592103

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	2.52335E-02	6.87572E-02	.78417497	.00000000	.1346[illegible]398	.06846347	.27092260	0.0000	.3670
4	1.67114515	2.59585E-02	7.04811E-02	.77824633	[illegible]	[illegible]	.05825915	.27068214	.0476	.3669
5	2.04229030	2.63774E-02	7.59785E-02	[illegible]	[illegible]	[illegible]	[illegible]	.27106090	.0952	.3695
6	2.41343545	2.61779E-02	7.691[illegible]E-02	[illegible]	[illegible]	[illegible]	.0217[illegible]78	.27067859	.1429	.3663
7	2.78[illegible]	2.64[illegible]E-02	7.70[illegible]E-02	[illegible]	[illegible]	[illegible]	.01413411	.270[illegible]75	.1905	.3655
8	3.155[illegible]	2.9[illegible]E-02	7.8[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.26996726	.2381	.3644
9	3.52687091	2.84037E-02	7.82134E-02	.7855[illegible]214	.075[illegible]8	.1[illegible]11160	.00[illegible]0125	.26950167	.2857	.3632
10	3.89801606	2.80735E-02	7.7662[illegible]E-02	.78[illegible]521	.07551772	.116[illegible]234	.0046[illegible]8	.26887974	.3333	.3615
11	4.26516121	2.79567E-02	7.74555E-02	.78782880	.07600266	.112[illegible]24	.00345153	.26860853	.3810	.3608
12	4.64030636	2.82845E-02	7.81854E-02	.78748268	.07911613	.10885719	.00269974	.26898393	.4286	.3618

J	R	P	RHO	U	V	W	(S-SINF3)/CV	A	T	H/HT
13	5.01145151	2.89892E-02	7.96024E-02	.78597868	.09404199	.10525309	.00216341	.26987954	.4762	.3642
14	5.38259066	2.99014E-02	8.14077E-02	.78374586	[illegible]	[illegible]	[illegible]	.27102651	.5238	.3673
15	5.75374181	3.09[illegible]E-02	8.35771E-02	.78127595	[illegible]	[illegible]	[illegible]	.27226063	.5714	.3707
16	6.12[illegible]	3.19[illegible]E-02	8.5[illegible]E-02	.7786[illegible]	[illegible]	[illegible]	.00115897	.27356523	.6190	.3742
17	6.49603211	3.30227E-02	[illegible]	.7760[illegible]	[illegible]	[illegible]	.000[illegible]25	.27492999	.6667	.3777
18	6.86717727	3.4[illegible]E-02	[illegible]	.773[illegible]	[illegible]	[illegible]	[illegible]	.27607259	.7143	.3811
19	7.2385[illegible]	3.516[illegible]E-02	9.147[illegible]	.7707[illegible]	[illegible]	[illegible]	[illegible]	.27729104	.7619	.3844
20	7.60946757	3.622[illegible]E-02	9.3[illegible]E-02	.768[illegible]	[illegible]	[illegible]	.000[illegible]275	.27844954	.8095	.3877
21	7.98061272	3.72778E-02	9.538[illegible]E-02	.7654[illegible]	[illegible]	[illegible]	[illegible]	.27957865	.8571	.3908
22	8.35175787	3.829[illegible]E-02	9.72163E-02	.7632[illegible]	[illegible]	[illegible]	[illegible]	.28063384	.9048	.3938
23	8.72290302	3.93[illegible]E-02	9.9[illegible]E-02	.76083549	.15256526	[illegible]	[illegible]	.28173515	.9524	.3968
24	9.09404817	4.00[illegible]E-02	1.00421E-01	.7561[illegible]	.154[illegible]85	[illegible]	[illegible]	.28244056	1.0000	.3989

K=18 PHI =150.0 Z = 15.5921[illegible]5

J	R	P	RHO	U	V	W	(S-SINF3)/CV	A	T	H/HT
3	1.30000000	3.08288E-02	7.93310E-02	.7782[illegible]	.00000000	.0756[illegible]	.06846347	.27878552	0.0000	.3886
4	1.68804126	3.026[illegible]E-02	7.90111E-02	.77656482	[illegible]	[illegible]	[illegible]	.27678048	.0476	.3850
5	2.0720[illegible]	3.14110E-02	8.252[illegible]E-02	.77743756	[illegible]	[illegible]	[illegible]	.27624612	.0952	.3816
6	2.45817378	3.08[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27409734	.1429	.3756
7	2.84[illegible]	3.07[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27329452	.1905	.3735
8	3.2[illegible]	3.0[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27235477	.2381	.3709
9	3.61624757	2.9[illegible]E-02	8.0[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.27134896	.2857	.3682
10	4.0[illegible]883	2.9[illegible]E-02	7.9[illegible]E-02	.787[illegible]	[illegible]	[illegible]	[illegible]	.27017271	.3333	.3650
11	4.38933010	2.85571E-02	7.8[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.26945703	.3810	.3630
12	4.77437156	2.862[illegible]E-02	7.8[illegible]E-02	.7885[illegible]	[illegible]	[illegible]	.0053[illegible]	.26947804	.4286	.3631
13	5.16041262	2.912[illegible]E-02	7.969[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.27009319	.4762	.3648
14	5.5[illegible]	2.9[illegible]E-02	8.131[illegible]E-02	.785[illegible]519	[illegible]	[illegible]	[illegible]	.27102630	.5238	.3673
15	5.93249524	3.07[illegible]E-02	8.301[illegible]E-02	.7826[illegible]	[illegible]	[illegible]	[illegible]	.27209927	.5714	.3702
16	6.31[illegible]	3.16[illegible]E-02	8.4[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.27322[illegible]	.6190	.3733
17	6.7[illegible]	3.2[illegible]E-02	8.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2745[illegible]	.6667	.3764
18	7.0[illegible]	3.3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2755[illegible]	.7143	.3795
19	7.4[illegible]	3.4[illegible]	9.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27665500	.7619	.3826
20	7.86270145	3.55778E-02	9.2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27773706	.8095	.3857
21	8.24874272	3.656[illegible]E-02	9.40[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.27881135	.8571	.3887
22	8.63478398	3.75160E-02	9.585[illegible]E-02	[illegible]	[illegible]	[illegible]	.000[illegible]786	.27982710	.9048	.3915
23	9.02082524	3.850[illegible]E-02	9.762[illegible]E-02	.78275107	[illegible]	[illegible]	.000[illegible]70	.28085240	.9524	.3944
24	9.40686650	3.91574E-02	9.88150E-02	.78078595	.144[illegible]	[illegible]7727	.00021368	.28152097	1.0000	.3963

K=19 PHI =160.0 Z = 15.5921[illegible]5

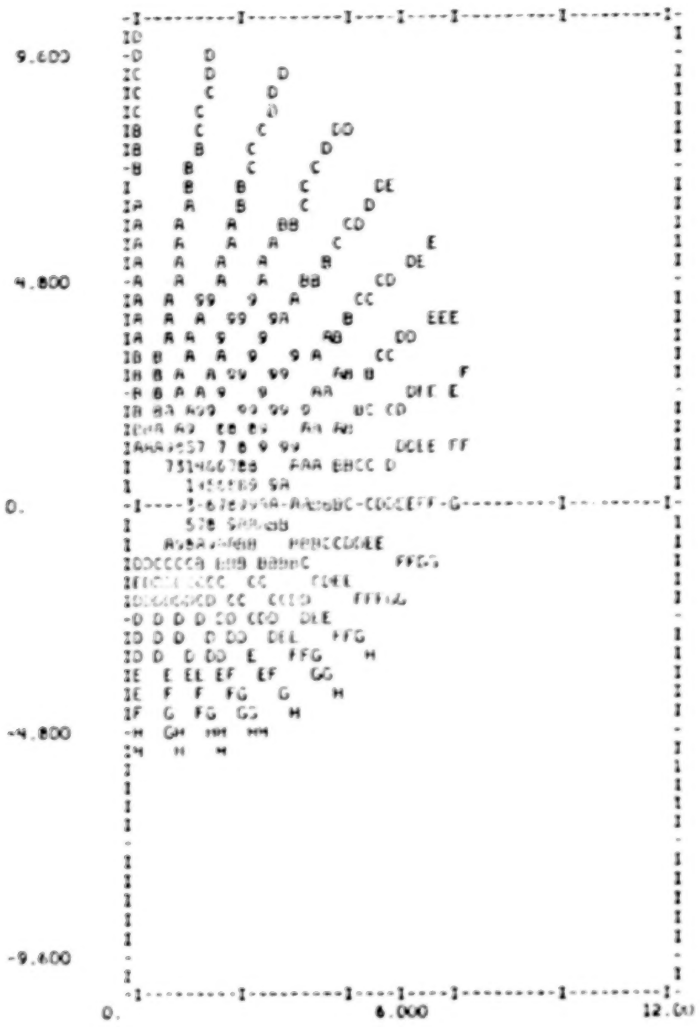
J	R	P	RHO	U	V	W	(S-SINF3)/CV	A	T	H/HT
3	1.30000000	3.27218E-02	8.27811E-02	.7764[illegible]	-.0[illegible]	[illegible]	.069[illegible]47	.28116929	0.0000	.3953
4	1.69785183	3.2412[illegible]E-02	8.3[illegible]E-02	.776[illegible]	[illegible]	[illegible]	.0553[illegible]635	.27931636	.0476	.3901
5	2.09570966	3.26[illegible]E-02	8.47[illegible]E-02	.7774[illegible]	[illegible]	[illegible]	[illegible]	.27765[illegible]	.0952	.3855
6	2.4935[illegible]	3.23712E-02	8.41121E-02	.78075177	[illegible]	[illegible]	.014[illegible]29	.2754[illegible]	.1429	.3795
7	2.891[illegible]	3.1936[illegible]E-02	8.47031E-02	.7815[illegible]	[illegible]	[illegible]	.01213704	.27461760	.1905	.3771
8	3.28925915	3.1[illegible]E-02	8.41[illegible]E-02	[illegible]	[illegible]	[illegible]	.00789962	.27365077	.2381	.3744
9	3.6871[illegible]	3.076[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27252452	.2857	.3715
10	4.0[illegible]	2.9[illegible]	8.1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27111190	.3333	.3675
11	4.48[illegible]	2.5111[illegible]	7.9[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27031134	.3810	.3649
12	4.8[illegible]	2.8[illegible]	7.5[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.26952473	.4286	.3643
13	5.2785[illegible]	2.9[illegible]	8.0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27035444	.4762	.3655
14	5.676[illegible]	2.9[illegible]	8.1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27115366	.5238	.3676
15	6.07[illegible]	3.077[illegible]E-02	8.3127[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27212534	.5714	.3703
16	6.4[illegible]7379	3.16[illegible]E-02	8.4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27317014	.6190	.3731
17	6.86[illegible]	3.25[illegible]E-02	8.6511[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27424331	.6667	.3760
18	7.26777745	3.3[illegible]	8.8[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27531628	.7143	.3790
19	7.6[illegible]	3.4[illegible]	9.0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2763[illegible]	.7619	.3819
20	8.06[illegible]	3.5[illegible]	9.17[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27741442	.8095	.3848
21	8.46[illegible]	3.62[illegible]E-02	9.3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27841197	.8571	.3876
22	8.85[illegible]77	3.767[illegible]E-02	9.5[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27934895	.9048	.3902
23	9.25703660	3.796[illegible]E-02	9.66[illegible]E-02	[illegible]	[illegible]	[illegible]	[illegible]	.28029333	.9524	.3928
24	9.65488843	3.85178E-02	9.76[illegible]	.7620[illegible]	.1515[illegible]	[illegible]	.00016190	.28095525	1.0000	.3944

K=20 PHI =170.0 Z = 15.1921C3

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.30000000	3.375[illegible]E-02	8.[illegible]E-02	.[illegible]	-.[illegible]	.[illegible]	.[illegible]	.28241913	0.0000	.3988
4	1.70551088	3.[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.28042639	.0476	.3972
5	2.11[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27718317	.0952	.3861
6	2.51[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27625784	.1429	.3818
7	2.92[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27559331	.1905	.3792
8	3.32[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27442300	.2381	.3785
9	3.73[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27323464	.2857	.3733
10	4.13[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27171096	.3333	.3691
11	4.54[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27058465	.3810	.3661
12	4.94[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27022065	.4286	.3651
13	5.35[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27056056	.4762	.3660
14	5.75[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27124473	.5238	.3679
15	6.16[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27213807	.5714	.3703
16	6.56[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27311645	.6190	.3730
17	6.97[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27413521	.6667	.3757
18	7.37[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27516412	.7143	.3786
19	7.78[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27619020	.7619	.3814
20	8.18[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27719199	.8095	.3842
21	8.59[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27816825	.8571	.3869
22	9.00[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27907850	.9048	.3894
23	9.40[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.27995118	.9524	.3919
24	9.81152841	9.81[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	.[illegible]	.28044729	1.0000	.3933

K=21 PHI =180.0 Z = 15.1921C3

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.30000000	3.38[illegible]E-02	8.[illegible]E-02	.[illegible]	-.[illegible]	0.[illegible]	.[illegible]	.28251718	0.0000	.3991
4	1.70751688	3.[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.28017820	.0476	.3925
5	2.11[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27759285	.0952	.3853
6	2.52[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27643789	.1429	.3821
7	2.93[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27559616	.1905	.3798
8	3.33[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27472941	.2381	.3774
9	3.74[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27355910	.2857	.3742
10	4.15[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27202547	.3333	.3700
11	4.55[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27085036	.3810	.3669
12	4.96[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27042721	.4286	.3657
13	5.37[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27066485	.4762	.3663
14	5.78[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27127996	.5238	.3679
15	6.19[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27208442	.5714	.3701
16	6.59[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27295588	.6190	.3725
17	7.00[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27391267	.6667	.3751
18	7.41[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27490086	.7143	.3778
19	7.82[illegible]E-02	8.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27590512	.7619	.3806
20	8.22[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27690546	.8095	.3834
21	8.63[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27788430	.8571	.3861
22	9.04[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27881123	.9048	.3887
23	9.45[illegible]E-02	9.[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.[illegible]	.27971422	.9524	.3912
24	9.85785000	9.79[illegible]E-02	9.65[illegible]E-02	.[illegible]	.[illegible]	0.[illegible]	.28022313	1.0000	.3926



VERTICAL SCALING

.300E-01	< 0 <	.350E-01	.350E-01	< 1 <	.400E-01
.400E-01	< 2 <	.450E-01	.450E-01	< 3 <	.500E-01
.500E-01	< 4 <	.550E-01	.550E-01	< 5 <	.600E-01
.600E-01	< 6 <	.650E-01	.650E-01	< 7 <	.700E-01
.700E-01	< 8 <	.750E-01	.750E-01	< 9 <	.800E-01
.800E-01	< A <	.850E-01	.850E-01	< B <	.900E-01
.900E-01	< C <	.950E-01	.950E-01	< D <	.100E+00
.100E+00	< E <	.105	.105	< F <	.110
.110	< G <	.115	.115	< H <	.120
.120	< I <	.125			

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K= 3 PHI = 0.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.86236E-02	9.31903E-02	.76520846	-.00000000	0.00000000	.06846347	.28790939	0.0000	.4145
4	1.70441859	3.93044E-02	9.88867E-02	.77434846	-.05402375	0.00000000	.00287382	.28194645	.0476	.3975
5	2.10883719	3.77288E-02	9.58104E-02	.77488497	-.07544131	0.00000000	.00620629	.28063720	.0952	.3938
6	2.51325578	3.70597E-02	9.48035E-02	.77494589	-.09484969	0.00000000	.00384126	.27971386	.1429	.3912
7	2.91767437	3.65183E-02	9.37955E-02	.77504804	-.09979954	0.00000000	.00335538	.27904859	.1905	.3893
8	3.32209297	3.62153E-02	9.32774E-02	.77494013	-.10580715	0.00000000	.00276715	.27865802	.2381	.3883
9	3.72651156	3.60453E-02	9.29170E-02	.77484251	-.10984411	0.00000000	.00255214	.27840549	.2857	.3875
10	4.13093015	3.59455E-02	9.25554E-02	.77465702	-.11235138	0.00000000	.00225605	.27829425	.3333	.3872
11	4.53534874	3.59437E-02	9.26436E-02	.77446180	-.11428120	0.00000000	.00176901	.27825934	.3810	.3871
12	4.93976734	3.60254E-02	9.30446E-02	.77420157	-.11519974	0.00000000	.00158274	.27833108	.4286	.3873
13	5.34418593	3.61464E-02	9.32424E-02	.77392686	-.11555765	0.00000000	.00139587	.27844588	.4762	.3877
14	5.74860452	3.62993E-02	9.35339E-02	.77363305	-.11576212	0.00000000	.00125698	.27860044	.5238	.3881
15	6.15302312	3.65674E-02	9.40347E-02	.77322369	-.11512579	0.00000000	.00112954	.27888032	.5714	.3889
16	6.55744171	3.68756E-02	9.46073E-02	.77277523	-.11480681	0.00000000	.00102344	.27920433	.6190	.3898
17	6.96186030	3.70835E-02	9.49952E-02	.77245273	-.11375671	0.00000000	.00092711	.27941947	.6667	.3904
18	7.36627890	3.72670E-02	9.53903E-02	.77215332	-.11341134	0.00000000	.00084644	.27964024	.7143	.3910
19	7.77069749	3.77503E-02	9.62217E-02	.77157634	-.11137852	0.00000000	.00077917	.28011659	.7619	.3923
20	8.17511608	3.84614E-02	9.75530E-02	.77060744	-.10815088	0.00000000	.00072196	.28087443	.8095	.3945
21	8.57953468	3.94343E-02	9.92762E-02	.76940383	-.10332216	0.00000000	.00066944	.28185739	.8571	.3972
22	8.98395327	4.04315E-02	1.01067E-01	.76813539	-.09651766	0.00000000	.00061927	.28285564	.9048	.4000
23	9.38837186	4.16051E-02	1.03156E-01	.76663357	-.09461888	0.00000000	.00057915	.28401417	.9524	.4033
24	9.79279046	4.25530E-02	1.04833E-01	.76539455	-.09085357	0.00000000	.00053110	.28492479	1.0000	.4059

K= 4 PHI = 10.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.80033E-02	9.21188E-02	.76551579	-.00000000	.03797846	.06846347	.28724423	0.0000	.4125
4	1.70680965	3.89159E-02	9.81787E-02	.77430685	-.05272618	.03505487	.00310169	.28157365	.0476	.3964
5	2.11361931	3.74756E-02	9.55471E-02	.77491935	-.07453551	.03[illegible]66	.00625717	.28037239	.0952	.3930
6	2.52042896	3.69006E-02	9.44653E-02	.77494668	-.08540684	.02756944	.00395021	.27952923	.1429	.3907
7	2.92723861	3.63777E-02	9.35304E-02	.77505464	-.09617859	.02662671	.00345758	.27890503	.1905	.3899
8	3.33404827	3.61004E-02	9.30098E-02	.77494578	-.10440377	.02576418	.00285672	.27854053	.2381	.3879
9	3.74085792	3.55524E-02	9.27801E-02	.77484593	-.10834843	.02514596	.00242148	.27831227	.2857	.3873
10	4.14766757	3.55719E-02	9.26870E-02	.77465977	-.11078427	.02464561	.00213621	.27821635	.3333	.3870
11	4.55447723	3.58762E-02	9.27198E-02	.77446543	-.11247893	.02[illegible]18	.00184257	.27819526	.3810	.3870
12	4.96128688	3.59705E-02	9.29015E-02	.77419499	-.11378532	.02[illegible]18	.00164910	.27827709	.4286	.3872
13	5.36809653	3.60983E-02	9.31506E-02	.77392573	-.11396920	.02[illegible]31	.00145370	.27837971	.4762	.3875
14	5.77490618	3.62591E-02	9.34575E-02	.77362236	-.11349116	.02[illegible]37	.00130722	.27855970	.5238	.3880
15	6.18171584	3.65291E-02	9.39615E-02	.77322119	-.11534180	.02315[illegible]83	.00117216	.27884288	.5714	.3888
16	6.58852549	3.68791E-02	9.45565E-02	.77277747	-.11242674	.02291943	.00105887	.27916747	.6190	.3897
17	6.99533514	3.70468E-02	9.45214E-02	.77245802	-.11148305	.02273486	.00095676	.27938245	.6667	.3903
18	7.40214480	3.72622E-02	9.53252E-02	.77213945	-.11153289	.02257356	.00086937	.27960525	.7143	.3909
19	7.80895445	3.77212E-02	9.61674E-02	.77153693	-.10947856	.02236863	.00079753	.28008749	.7619	.3922
20	8.21576410	3.84549E-02	9.75042E-02	.77060271	-.10645220	.02212447	.00073551	.28085321	.8095	.3944
21	8.62257376	3.94144E-02	9.92597E-02	.76938717	-.10199428	.02183665	.00068013	.28183915	.8571	.3972
22	9.02938341	4.04267E-02	1.01022E-01	.76811782	-.09772470	.02157470	.00062454	.28283542	.9048	.4000
23	9.43619306	4.15979E-02	1.03143E-01	.76660073	-.09265139	.02126948	.00058498	.28400774	.9524	.4033
24	9.84300272	4.25286E-02	1.04791E-01	.76537269	-.08847936	.02107575	.00052723	.28490108	1.0000	.4058

K= 5 PHI = 20.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.62536E-02	8.90690E-02	.76631622	-.00000000	.07570418	.06846347	.28531657	0.0000	.4070
4	1.71400191	3.78055E-02	9.62117E-02	.77438653	-.05608468	.06[illegible]	.00238437	.28033567	.0476	.3929
5	2.12800382	3.67236E-02	9.39945E-02	.77504203	-.07044627	.05[illegible]89	.00538494	.27953454	.0952	.3907
6	2.54200573	3.63441E-02	9.34358E-02	.77502333	-.08505425	.055[illegible]18	.00395285	.27891737	.1429	.3890
7	2.95600764	3.59352E-02	9.27156E-02	.77513313	-.09517398	.05[illegible]75	.00346305	.27841833	.1905	.3876
8	3.37000955	3.57380E-02	9.23872E-02	.77502684	-.09910069	.05111826	.00290194	.27814382	.2381	.3868
9	3.78401145	3.56268E-02	9.22125E-02	.77492710	-.10359473	.04978669	.00246500	.27797660	.2857	.3864
10	4.19801336	3.56067E-02	9.21932E-02	.77474054	-.10577482	.0[illegible]	.00218046	.27792543	.3333	.3862
11	4.61201527	3.56439E-02	9.22626E-02	.77454859	-.10738140	.04791956	.00188297	.27793792	.3810	.3862

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
12	5.02601718	3.57593E-02	9.25090E-02	.77428256	-.10819389	.04721999	.00168493	.27804664	.4286	.3865
13	5.44001909	3.59037E-02	9.27887E-02	.77401132	-.108[illegible]458	.04[illegible]67457	.00148442	.27818680	.4762	.3869
14	5.85400100	3.60784E-02	9.31217E-02	.77371629	-.1080[illegible]493	[illegible]	.00173376	.27836509	.5238	.3874
15	6.26802291	3.63655E-02	9.36597E-02	.77350910	-.107[illegible]3771	[illegible]	.00119445	.27866602	.5714	.3883
16	6.68200482	3.66900E-02	9.42450E-02	.77280590	-.10721695	.04518174	.00107705	.27899817	.6190	.3892
17	7.09602673	3.68922E-02	9.48425E-02	.77254117	-.10657479	.044[illegible]	.00096999	.27921762	.6667	.3898
18	7.51000864	3.71212E-02	9.50446E-02	.77221565	-.105[illegible]7429	.044[illegible]117	.00088300	.27945489	.7143	.3905
19	7.92403054	3.76[illegible]E-02	9.59464E-02	.77158635	-.104[illegible]769	[illegible]	.00090521	.27965974	.7619	.3919
20	8.33801245	3.85514E-02	9.73114E-02	.7710[illegible]482	-.100[illegible]462	[illegible]	.00075681	.28074505	.8095	.3941
21	8.75203436	3.95244E-02	9.[illegible]7778E-02	.76937858	-.09643649	[illegible]	.00068101	.28174622	.8571	.3969
22	9.16603627	4.07[illegible]E-02	1.00978E-01	.76829746	-.09216455	[illegible]	.00062125	.28275050	.9048	.3997
23	9.58003818	4.15507E-02	1.03025E-01	.76652047	-.087[illegible]	.04191536	.00057937	.28394179	.9524	.4031
24	9.99404009	4.24516E-02	1.04656E-01	.76550015	-.08342888	.04154297	.00051513	.28482609	1.0000	.4056

K= 6 PHI = 30.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	3.35036E-02	8.41892E-02	.76756579	-.00000000	.11351815	.06846347	.28211926	0.0000	.3980
4	1.72612138	3.60640E-02	9.30997E-02	.77446355	-.04[illegible]607	.1051[illegible]78	.00125755	.27894138	.0476	.3874
5	2.15224276	3.55770E-02	9.18319E-02	.77519405	-.08445697	.08847778	.00573425	.27820106	.0952	.3870
6	2.57836414	3.54624E-02	9.14121E-02	.77517613	-.07873436	[illegible]	.00593503	.27793867	.1429	.3862
7	3.00448552	3.52257E-02	9.14045E-02	.77528218	-.08[illegible]8675	.0782[illegible]56	.00346686	.27762676	.1905	.3854
8	3.43060691	3.51557E-02	9.13096E-02	.77516178	-.06[illegible]8550	.07547676	.00294137	.27749575	.2381	.3850
9	3.85672829	3.51269E-02	9.12844E-02	.77507748	-.06518734	.0734[illegible]712	.00249538	.27741901	.2857	.3848
10	4.28284967	3.51676E-02	9.13785E-02	.77460110	-.06772573	.0718[illegible]60	.00221264	.27743691	.3333	.3849
11	4.70897105	3.52531E-02	9.15546E-02	.77471152	-.08[illegible]684	.07[illegible]71	.00191196	.27750348	.3810	.3850
12	5.13509243	3.54040E-02	9.18442E-02	.77444822	-.06471601	.069[illegible]91	.00170956	.27765271	.4286	.3855
13	5.56121381	3.55751E-02	9.21802E-02	.77417848	-.100[illegible]5572	.068[illegible]69	.00150949	.27782426	.4762	.3859
14	5.98733519	3.57701E-02	9.25827E-02	.77387696	-.10[illegible]2176	.06791165	.00135462	.27803303	.5238	.3865
15	6.41345657	3.60478E-02	9.31451E-02	.77344759	-.095[illegible]5476	.06706111	.00121466	.27836312	.5714	.3874
16	6.83957795	3.64114E-02	9.37503E-02	.7730[illegible]0	-.0587[illegible]	.066[illegible]	.00109330	.27870648	.6190	.3884
17	7.26569933	3.66[illegible]E-02	9.41591E-02	.772[illegible]463	-.09761049	[illegible]	.00098367	.27893376	.6667	.3890
18	7.69182072	3.69016E-02	9.46274E-02	.77294847	-.05722273	.0659[illegible]	.00090071	.27919796	.7143	.3898
19	8.11794210	3.73561E-02	9.55737E-02	.77167694	-.06513550	[illegible]	.00081246	.27974298	.7619	.3913
20	8.54406348	3.81767E-02	9.69493E-02	.77206363	-.06172925	.06942177	.00074272	.28056276	.8095	.3936
21	8.97018486	3.91719E-02	9.88032E-02	.76958822	-.0817[illegible]5	.0678[illegible]781	.00067885	.28158958	.8571	.3965
22	9.39630624	4.01817E-02	1.00621E-01	.76803768	-.083[illegible]4534	.062[illegible]40	.00061342	.28260875	.9048	.3993
23	9.82242762	4.14234E-02	1.02911E-01	.76641457	-.07789358	.06137448	.00056695	.28382173	.9524	.4028
24	10.24854900	4.25291E-02	1.04442E-01	.76517179	-.07433[illegible]8	.06041094	.00049620	.28470659	1.0000	.4053

K= 7 PHI = 40.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	2.99597E-02	7.76904E-02	.76815923	-.00000000	.1517[illegible]8	.06846347	.27762277	0.0000	.3854
4	1.74328953	3.37604E-02	8.89091E-02	.77469357	-.04[illegible]78	.13646445	-.00655261	.27553971	.0476	.3796
5	2.18657906	3.39481E-02	8.89200E-02	.77543580	-.05868328	.1178[illegible]71	.00510319	.27632693	.0952	.3818
6	2.62986859	3.42452E-02	8.95566E-02	.77576904	-.06891666	.108[illegible]12	.00379752	.27654200	.1429	.3824
7	3.07315812	3.42255E-02	8.96274E-02	.77548441	-.0767[illegible]22	.102[illegible]42	.00342598	.27652978	.1905	.3823
8	3.51644765	3.47[illegible]E-02	8.[illegible]137E-02	.77575405	-.0810[illegible]71	.059[illegible]	.00258548	.27658680	.2381	.3825
9	3.95973718	3.444[illegible]E-02	9.[illegible]E-02	.77530941	-.084[illegible]07	.0596[illegible]5	.00256678	.27664905	.2857	.3827
10	4.40302672	3.45724E-02	9.02659E-02	.7751[illegible]49	-.08[illegible]57	.0594[illegible]44	.00230786	.27677028	.3333	.3830
11	4.84631625	3.47257E-02	9.05717E-02	.7746[illegible]	-.087[illegible]452	.091[illegible]742	.0020[illegible]294	.27691822	.3810	.3834
12	5.28960578	3.49523E-02	9.09691E-02	.77465468	-.08919175	.06015442	.00182286	.27713046	.4286	.3840
13	5.73289531	3.51431E-02	9.13737E-02	.77439936	-.088[illegible]23	.088[illegible]0	.00158886	.27734749	.4762	.3846
14	6.17618484	3.55852E-02	9.18299E-02	.77407233	-.089[illegible]32	.08779473	.00142774	.27760151	.5238	.3853
15	6.61947437	3.57289E-02	9.24762E-02	.77362692	-.08[illegible]3782	.086[illegible]3	.00127395	.27796580	.5714	.3863
16	7.06276390	3.60618E-02	9.32056E-02	.77318781	-.07[illegible]65	.08[illegible]3	.00115481	.27852728	.6190	.3873
17	7.50605343	3.6[illegible]E-02	9.3[illegible]E-02	.77298981	-.0866[illegible]68	[illegible]	[illegible]	.27856483	.6667	.3880
18	7.94934296	3.65715E-02	9.4[illegible]E-02	.77252111	-.08[illegible]445	[illegible]	[illegible]	.27888294	.7143	.3888
19	8.39263249	3.71271E-02	9.50812E-02	.77179272	-.089[illegible]727	[illegible]	[illegible]	.27945581	.7619	.3905
20	8.83592202	3.79427E-02	9.65735E-02	.77073459	-.07847191	.082[illegible]767	.00074614	.28031670	.8095	.3929
21	9.27921155	3.89614E-02	9.84241E-02	.76935518	-.0759[illegible]49	.081[illegible]75	.00067422	.28137251	.8571	.3959
22	9.72250108	3.99875E-02	1.00279E-01	.76796913	-.07371[illegible]8	[illegible]	.00060116	.28241182	.9048	.3988
23	10.16579061	4.12324E-02	1.02449E-01	.76627191	-.0655[illegible]75	.07[illegible]6	.00054875	.28364626	.9524	.4023
24	10.60908015	4.21549E-02	1.04136E-01	.76469626	-.06197585	.079[illegible]	.00047001	.28453624	1.0000	.4048

K= 8 PHI = 50.0 Z = 35.[illegible]

J	R	P	RHO	U	V	W	(S-SQ*F)/CV	A	T	M/MT
3	1.50000000	2.59113E-02	7.00[illegible]E-02	.3[illegible]	.0[illegible]	.18[illegible]	.06[illegible]	.27[illegible]	0.0000	.3698
4	1.76[illegible]	3.11[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.16[illegible]	-.00[illegible]	.27[illegible]	.0476	.3705
5	2.28[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.0952	.3756
6	2.69[illegible]	3.28[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1429	.3779
7	3.10[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1905	.3787
8	3.6[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2381	.3791
9	4.0[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2857	.3802
10	4.[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.3333	.3808
11	5.02[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.3810	.3814
12	5.[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.4286	.3822
13	5.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.4762	.3829
14	6.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.5238	.3837
15	6.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.5714	.3849
16	7.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.6190	.3859
17	7.81[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.6667	.3866
18	8.28[illegible]	3.61[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.7143	.3875
19	8.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.7619	.3894
20	9.21[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.8095	.3919
21	9.68[illegible]	3.86[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.8571	.3950
22	10.[illegible]	3.[illegible]E-02	9.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.9048	.3980
23	10.61[illegible]	4.0[illegible]E-02	1.0[illegible]E-01	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	.9524	.4016
24	11.07[illegible]	4.19225E-02	1.03[illegible]E-01	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	1.0000	.4042

K= 9 PHI = 60.0 Z = 35.[illegible]

J	R	P	RHO	U	V	W	(S-SQ*F)/CV	A	T	M/MT
3	1.50000000	2.1383[illegible]E-02	6.1[illegible]E-02	.3[illegible]	.0[illegible]	.2[illegible]	.06[illegible]	.26[illegible]	0.0000	.3570
4	1.79[illegible]	2.81[illegible]E-02	7.82[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	-.00[illegible]	.26[illegible]	.0476	.3597
5	2.28[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.0952	.3693
6	2.[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1429	.3724
7	3.27[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1905	.3743
8	3.[illegible]	3.[illegible]E-02	8.[illegible]E-02	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2381	.3758
9	4.[illegible]	3.[illegible]	8.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2857	.3769
10	4.[illegible]	3.[illegible]	8.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.3333	.3778
11	5.[illegible]	3.[illegible]	8.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.3810	.3789
12	5.[illegible]	3.[illegible]	8.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.4286	.3796
13	6.23[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.4762	.3807
14	6.7[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.5238	.3818
15	7.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.5714	.3830
16	7.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.6190	.3841
17	8.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.6667	.3848
18	8.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.7143	.3860
19	9.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.7619	.3881
20	9.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.8095	.3908
21	10.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	.8571	.3940
22	10.[illegible]	3.[illegible]	9.[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	.9048	.3971
23	11.16[illegible]	4.06[illegible]	1.01[illegible]	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	.9524	.4007
24	11.65[illegible]	4.16293E-02	1.05215E 01	.3[illegible]	-.0[illegible]	.1[illegible]	.00[illegible]	.28[illegible]	1.0000	.4033

K=10 PHI = 70.0 Z = 35.[illegible]

J	R	P	RHO	U	V	W	(S-SQ*F)/CV	A	T	M/MT
3	1.50000000	1.70422E-02	5.15[illegible]E-02	.3[illegible]	.0[illegible]	.2[illegible]	.06[illegible]	.25[illegible]	0.0000	.3281
4	1.8[illegible]	2.51[illegible]E-02	7.21[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	-.00[illegible]	.26[illegible]	.0476	.3477
5	2.35[illegible]	2.77[illegible]E-02	7.70[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.26[illegible]	.0952	.3601
6	2.87[illegible]	2.95876E-02	8.04[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1429	.3667
7	3.40[illegible]	3.04[illegible]E-02	8.23[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.1905	.3697
8	3.93[illegible]	3.11[illegible]E-02	8.37[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2381	.3721
9	4.45[illegible]	3.16[illegible]E-02	8.47[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.2857	.3737
10	4.98[illegible]	3.21[illegible]E-02	8.55[illegible]E-02	.3[illegible]	-.01[illegible]	.1[illegible]	.00[illegible]	.27[illegible]	.3333	.3750

11	5.510963726	3.2491[illegible]E-02	8.[illegible]E 02	.7761[illegible]	-.0[illegible]	.[illegible]	.0021[illegible]	.27[illegible]	.3810	.3762
12	6.0[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.4284	.3774
13	6.[illegible]	3.[illegible] 02	8.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.4762	.3785
14	7.[illegible]	3.[illegible] 02	8.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.5238	.3797
15	7.[illegible]	3.[illegible] 02	8.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.5716	.3810
16	8.[illegible]	3.[illegible] 02	8.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.6190	.3821
17	8.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.6667	.3829
18	9.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.7143	.3843
19	9.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.7619	.3846
20	10.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.27[illegible]	.8095	.3895
21	10.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.28[illegible]	.8571	.3928
22	11.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.28[illegible]	.9048	.3960
23	11.8[illegible]	4.[illegible]E-02	1.[illegible] 01	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.28[illegible]	.9524	.3996
24	12.[illegible]	4.[illegible]E-02	1.[illegible] 01	.7[illegible]	-.0[illegible]	[illegible]	.0021[illegible]	.28[illegible]	1.0000	.4033

K=11 PHI = 80.0 Z = 33.[illegible]

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.[illegible]	1.46[illegible]E-02	4.[illegible]E-02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.25[illegible]	0.0000	.3145
4	1.8[illegible]	1.[illegible]E-02	6.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	-.0[illegible]	.25[illegible]	.0476	.3164
5	2.[illegible]	2.[illegible]E-02	7.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.26[illegible]	.0952	.3539
6	2.99[illegible]	2.[illegible] 02	7.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.26[illegible]	.1429	.3618
7	3.[illegible]	2.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.1905	.3660
8	4.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.2381	.3688
9	4.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.2857	.3707
10	5.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.3333	.3723
11	5.8[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.3810	.3737
12	6.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.4286	.3749
13	6.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.4762	.3760
14	7.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.5238	.3774
15	8.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.5714	.3787
16	8.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.6190	.3797
17	9.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.6667	.3806
18	9.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.7143	.3825
19	10.[illegible]	3.[illegible] 02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.7619	.3848
20	10.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.8095	.3879
21	11.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.8571	.3913
22	12.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.28[illegible]	.9048	.3946
23	12.[illegible]	3.[illegible]E-02	1.[illegible] 01	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.28[illegible]	.9524	.3983
24	13.[illegible]	4.[illegible]E-02	1.[illegible] 01	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.28[illegible]	1.0000	.4011

K=12 PHI = 90.0 Z = 33.[illegible]

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.[illegible]	1.64[illegible]E-02	5.[illegible]E-02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.25[illegible]	0.0000	.3248
4	1.9[illegible]	2.0[illegible]E-02	6.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	-.0[illegible]	.25[illegible]	.0476	.3282
5	2.[illegible]	2.[illegible]E-02	7.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.26[illegible]	.0952	.3507
6	3.[illegible]	2.[illegible]E-02	7.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.26[illegible]	.1429	.3591
7	3.[illegible]	2.[illegible]E-02	7.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.26[illegible]	.1905	.3640
8	4.[illegible]	2.[illegible]E-02	8.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.2381	.3669
9	4.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.2857	.3688
10	5.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.3333	.3702
11	6.[illegible]	3.[illegible]E-02	8.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.3810	.3715
12	6.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.4286	.3727
13	7.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	-.0[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.4762	.3739
14	7.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.5238	.3752
15	8.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.5714	.3765
16	9.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.6190	.3774
17	9.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.6667	.3784
18	10.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.7143	.3803
19	11.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.7619	.3830
20	11.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.8095	.3862
21	12.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.27[illegible]	.8571	.3897
22	12.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.28[illegible]	.9048	.3931
23	13.[illegible]	3.[illegible]E-02	9.[illegible] 02	.7[illegible]	.[illegible]	.[illegible]	.0[illegible]	.28[illegible]	.9524	.3969

24	14.04937326	4.03397E-02	1.00435E-01	.78465620	.05205206	.12457310	.00024544	.28273008	1.0000	.3997

K=13 PHI =100.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	2.46641E-02	6.74452E-02	.78249384	[illegible]	.15057360	.00846347	.27004063	0.0000	.3646
4	1.95335469	1.91209E-02	[illegible]	.77579166	[illegible]	[illegible]	-.00510333	.25381511	.0476	.3221
5	2.60032978	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00447212	.26712527	.0952	.3568
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.26828520	.1429	.3599
7	[illegible]	2.90637E-02	[illegible]	[illegible]	[illegible]	[illegible]	.00437109	[illegible]	.1905	.3652
8	[illegible]	2.96772E-02	[illegible]	.77731885	[illegible]	[illegible]	.00413652	.27097478	.2381	.3671
9	[illegible]	3.01772E-02	[illegible]	.77759425	[illegible]	[illegible]	.00736299	.27155148	.2857	.3687
10	[illegible]	[illegible]	[illegible]	.77776552	[illegible]	[illegible]	.00277032	.27193386	.3333	.3697
11	[illegible]	[illegible]	[illegible]	.77788173	[illegible]	[illegible]	[illegible]	.27226806	.3810	.3706
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00178067	.27252557	.4286	.3714
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27281688	.4762	.3721
14	8.48701159	[illegible]	[illegible]	.77712330	[illegible]	[illegible]	.00117026	.27323538	.5238	.3733
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.3743
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00079292	.27386777	.6190	.3750
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00067153	.27424696	.6667	.3761
18	[illegible]	3.32129E-02	[illegible]	[illegible]	[illegible]	[illegible]	.00058078	.27521915	.7143	.3782
19	[illegible]	3.41216E-02	[illegible]	[illegible]	[illegible]	[illegible]	.00050655	.27607368	.7619	.3811
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00042613	.27729441	.8095	.3844
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00036150	.27854594	.8571	.3879
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27977813	.9048	.3924
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.28115136	.9524	.3952
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00019159	.28213677	1.0000	.3990

K=14 PHI =110.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00846347	.27963258	0.0000	.3910
4	[illegible]	[illegible]	[illegible]	.77787183	[illegible]	[illegible]	[illegible]	.25407899	.0476	.3220
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27261107	.0952	.3716
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1429	.3656
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27254473	.1905	.3715
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27231273	.2381	.3708
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27257835	.2857	.3715
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27247369	.3333	.3712
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27246374	.3810	.3713
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27257511	.4286	.3714
13	[illegible]	[illegible]	[illegible]	.77815511	[illegible]	[illegible]	[illegible]	.27266264	.4762	.3717
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27287567	.5238	.3723
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5714	.3727
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27316381	.6190	.3731
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6667	.3741
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7143	.3763
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7619	.3793
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27663727	.8095	.3826
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27791294	.8571	.3862
22	[illegible]	3.69132E-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27916700	.9048	.3897
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9524	.3935
24	[illegible]	3.91632E-02	9.88213E-02	[illegible]	[illegible]	[illegible]	[illegible]	.28152691	1.0000	.3963

K=15 PHI =120.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	H/HT
3	1.30000000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00846347	.27845013	0.0000	.3905
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.26057589	.0476	.3395
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27661729	.0952	.3826
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27290267	.1429	.3724
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00717365	.27521220	.1905	.3787
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2381	.3758
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.27452629	.2857	.3763

10	6.56[illegible]E-02	3.20[illegible]E-02	5.94[illegible]E-02	.736[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.3333	.3751
11	7.31[illegible]E-02	3.19[illegible]E-02	8.[illegible]E-02	.737[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.3810	.3744
12	8.06[illegible]E-02	3.18[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.4286	.3734
13	8.82[illegible]E-02	3.19[illegible]E-02	8.[illegible]E-02	.738[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.4762	.3726
14	9.57[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.5238	.3724
15	10.3[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.5714	.3720
16	11.0[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.6190	.3717
17	11.8[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.6667	.3715
18	12.5[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.7143	.3714
19	13.3[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.7619	.3716
20	14.0[illegible]E-02	3.[illegible]E-02	8.[illegible]E-02	.739[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.8095	.3810
21	14.8[illegible]E-02	3.[illegible]E-02	9.[illegible]E-02	.738[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.8571	.3845
22	15.5[illegible]E-02	3.63[illegible]E-02	9.[illegible]E-02	.738[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.9048	.3881
23	16.3[illegible]E-02	3.78[illegible]E-02	9.[illegible]E-02	.738[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.27[illegible]	.9524	.3919
24	17.09[illegible]E-02	3.85[illegible]E-02	9.78[illegible]E-02	.738[illegible]	.06[illegible]	.19[illegible]	.00[illegible]	.28093523	1.0000	.3948

K=16 PHI =130.0 Z = 33.800000

J	R	P	RHO	U	V	W	(5-SIN²)/2V	A	T	M/MT
3	1.56[illegible]	3.02[illegible]E-02	7.81[illegible]E-02	.785[illegible]	-.00[illegible]	.00[illegible]	.06[illegible]	.27787999	0.0000	.3864
4	2.10[illegible]	2.77[illegible]E-02	7.67[illegible]E-02	.778[illegible]	.1[illegible]	.19[illegible]	.00[illegible]	.26907151	.0476	.3620
5	2.90[illegible]	3.46[illegible]E-02	9.10[illegible]E-02	.768[illegible]	.07[illegible]	.19[illegible]	.00[illegible]	.27717338	.0952	.3841
6	3.70[illegible]	3.18[illegible]E-02	8.47[illegible]E-02	.779[illegible]	.09[illegible]	.19[illegible]	.00[illegible]	.27807725	.1429	.3756
7	4.50[illegible]	3.34[illegible]E-02	8.78[illegible]E-02	.779[illegible]	.07[illegible]	.14[illegible]	.00[illegible]	.27810467	.1905	.3812
8	5.30[illegible]	3.26[illegible]E-02	8.59[illegible]E-02	.775[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27491999	.2381	.3779
9	6.10[illegible]	3.31[illegible]E-02	8.70[illegible]E-02	.779[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27522980	.2857	.3788
10	6.9[illegible]	3.28[illegible]	8.63[illegible]E-02	.778[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27488263	.3333	.3778
11	7.7[illegible]	3.29[illegible]E-02	8.65[illegible]E-02	.778[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27479423	.3810	.3776
12	8.5[illegible]	3.29[illegible]E-02	8.64[illegible]E-02	.777[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27490003	.4286	.3765
13	9.3[illegible]	3.27[illegible]E-02	8.60[illegible]E-02	.777[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27404812	.4762	.3755
14	10.1[illegible]	3.19[illegible]E-02	8.39[illegible]E-02	.775[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27354546	.5238	.3741
15	10.9[illegible]	3.14[illegible]E-02	8.26[illegible]E-02	.774[illegible]	.08[illegible]	.11[illegible]	.00[illegible]	.27293266	.5714	.3725
16	11.7[illegible]	3.13[illegible]E-02	8.23[illegible]E-02	.78[illegible]	.07[illegible]	.11[illegible]	.00[illegible]	.27299753	.6190	.3713
17	12.5[illegible]	3.12[illegible]E-02	8.[illegible]E-02	.78[illegible]	.07[illegible]	.11[illegible]	.00[illegible]	.27259750	.6667	.3715
18	13.3[illegible]	3.19[illegible]E-02	8.[illegible]E-02	.775[illegible]	.09[illegible]	.11[illegible]	.00[illegible]	.27326619	.7143	.3734
19	14.1[illegible]	3.20[illegible]E-02	8.[illegible]E-02	.777[illegible]	.09[illegible]	.1[illegible]	.00[illegible]	.27429719	.7619	.3762
20	14.9[illegible]	3.16[illegible]E-02	8.[illegible]E-02	.777[illegible]	.1[illegible]	.1[illegible]	.00[illegible]	.27548958	.8095	.3794
21	15.7[illegible]	3.[illegible]E-02	8.[illegible]E-02	.77[illegible]	.09[illegible]	.1[illegible]	.00[illegible]	.27671695	.8571	.3829
22	16.50[illegible]	3.58[illegible]E-02	9.[illegible]E-02	.77[illegible]	.06[illegible]	.1[illegible]	.00[illegible]	.27765388	.9048	.3863
23	17.30[illegible]	3.70[illegible]E-02	9.[illegible]E-02	.767[illegible]	.[illegible]	.[illegible]	.00[illegible]	.27830952	.9524	.3901
24	18.1019863[illegible]	3.79[illegible]E-02	9.66[illegible]E-02	.765[illegible]	.16[illegible]	.[illegible]	.00[illegible]	.28025581	1.0000	.3927

K=17 PHI =140.0 Z = 33.800000

J	R	P	RHO	U	V	W	(5-SIN²)/2V	A	T	M/MT
3	1.50[illegible]	2.85[illegible]E-02	7.56[illegible]E-02	.787[illegible]	-.00[illegible]	-.01[illegible]	.06[illegible]	.27572596	0.0000	.3801
4	2.1[illegible]	3.0[illegible]	8.08[illegible]	.779[illegible]	.1[illegible]	.[illegible]	.[illegible]	.27[illegible]	.0476	.3767
5	2.98[illegible]	3.34[illegible]E-02	8.86[illegible]	.768[illegible]	.[illegible]	.[illegible]	.[illegible]	.27815087	.0952	.3812
6	3.85[illegible]	3.[illegible]	8.58[illegible]	.774[illegible]	.[illegible]	.[illegible]	.[illegible]	.27523871	.1429	.3788
7	4.67[illegible]	3.31[illegible]E-02	8.76[illegible]E-02	.775[illegible]	.[illegible]	.[illegible]	.[illegible]	.27638188	.1905	.3819
8	5.52[illegible]	3.29[illegible]E-02	8.69[illegible]E-02	.775[illegible]	.[illegible]	.[illegible]	.[illegible]	.27538902	.2381	.3792
9	6.36[illegible]	3.32[illegible]E-02	8.76[illegible]E-02	.775[illegible]	.[illegible]	.[illegible]	.[illegible]	.27[illegible]	.2857	.3796
10	7.21[illegible]	3.30[illegible]E-02	8.73[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.2751[illegible]	.3333	.3785
11	8.0[illegible]	3.[illegible]	8.[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.27504[illegible]	.3810	.3783
12	8.9[illegible]	3.[illegible]	8.[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.27486[illegible]	.4286	.3778
13	9.7[illegible]	3.[illegible]	8.[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.27486[illegible]	.4762	.3777
14	10.5[illegible]	3.29[illegible]	8.69[illegible]E-02	.777[illegible]	.[illegible]	.[illegible]	.[illegible]	.27452197	.5238	.3768
15	11.4[illegible]	3.[illegible]	8.[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.27382715	.5714	.3743
16	12.27[illegible]	3.12[illegible]E-02	8.[illegible]E-02	.781[illegible]	.[illegible]	.[illegible]	.[illegible]	.27271755	.6190	.3719
17	13.12[illegible]	3.11[illegible]E-02	8.[illegible]E-02	.781[illegible]	.[illegible]	.[illegible]	.[illegible]	.27251121	.6667	.3713
18	13.96[illegible]	3.15[illegible]E-02	8.[illegible]E-02	.78[illegible]	.[illegible]	.[illegible]	.[illegible]	.27321624	.7143	.3728
19	14.81[illegible]	3.29[illegible]E-02	8.[illegible]E-02	.779[illegible]	.[illegible]	.[illegible]	.[illegible]	.27397830	.7619	.3753
20	15.65[illegible]	3.39[illegible]E-02	8.[illegible]E-02	.778[illegible]	.[illegible]	.[illegible]	.[illegible]	.27504809	.8095	.3784
21	16.50[illegible]	3.43[illegible]E-02	8.[illegible]E-02	.777[illegible]	.[illegible]	.[illegible]	.[illegible]	.27629208	.8571	.3817
22	17.34[illegible]	3.55[illegible]E-02	9.[illegible]E-02	.771[illegible]	.11[illegible]	.[illegible]	.[illegible]	.27[illegible]	.9048	.3850

23	18.19196455	3.65728E-02	9.41131E-02	.76908516	.11959446	.08448337	.00011125	.27878483	.9524	.3886
24	19.03656278	3.73909E-02	9.56164E-02	.76811264	.12283181	.08526016	.00004858	.27966105	1.0000	.3911

K-18 PHI =150.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.30000000	2.76699E-02	7.34553E-02	.78993943	-.00000000	-.02887043	.06846347	.27451354	0.0000	.3768
4	2.18207394	3.29419E-02	8.31139E-02	.77511916	.03435017	.04	.05732735	.27983231	.0476	.3915
5	3.06434769	3.34050E-02	8.36179E-02	.77169092	.10942537	.12	.02346559	.27506831	.0952	.3783
6	3.94633153	3.35503E-02	8.34037E-02	.77377837	.10101173	.09	.01334964	.27707181	.1429	.3838
7	4.82830238	3.34773E-02	8.35747E-02	.77419526	.10553128	.09	.01349897	.27650543	.1905	.3823
8	5.71026922	3.34341E-02	8.37561E-02	.77557383	.10844769	.07621231	.00825918	.27603614	.2381	.3810
9	6.59244306	3.35174E-02	8.36305E-02	.77534621	.10977412	.07558536	.00537238	.27585024	.2857	.3805
10	7.47451691	3.34173E-02	8.36028E-02	.77613995	.11176199	.07367596	.00376194	.27557325	.3333	.3797
11	8.35669075	3.33993E-02	8.36035E-02	.77651858	.11224922	.07	.00288187	.27545250	.3810	.3794
12	9.23866460	3.31841E-02	8.36515E-02	.77683192	.11259625	.07	.00229466	.27515395	.4286	.3785
13	10.12083844	3.31805E-02	8.36605E-02	.77697258	.11367526	.07	.00187353	.27510738	.4762	.3784
14	11.00281228	3.31670E-02	8.36609E-02	.77641239	.11	.07	.00155265	.27505556	.5238	.3783
15	11.88468613	3.32700E-02	8.36714E-02	.77851206	.11197458	.07	.00131001	.27430587	.5714	.3765
16	12.76665997	3.31453E-02	8.36478E-02	.78067095	.10814352	.07	.00107386	.27329751	.6190	.3735
17	13.64903382	3.32864E-02	8.41374E-02	.78190211	.10676116	.07	.00085286	.27270807	.6667	.3718
18	14.53110766	3.34822E-02	8.45431E-02	.78157193	.10796866	.07	.00068989	.27293543	.7143	.3725
19	15.41318150	3.31206E-02	8.37554E-02	.77961918	.11167619	.07	.00054897	.27370551	.7619	.3746
20	16.29535535	3.29784E-02	8.33902E-02	.77728330	.11626172	.07	.00041780	.27472508	.8095	.3774
21	17.17734919	3.35644E-02	8.02376E-02	.77465527	.12115814	.06	.00029791	.27556034	.8571	.3805
22	18.05952304	3.46987E-02	9.11758E-02	.77189300	.12602184	.06	.00019479	.27703398	.9048	.3837
23	18.94147688	3.61322E-02	9.33019E-02	.76887597	.13113743	.06	.00011182	.27830260	.9524	.3873
24	19.82355072	3.68869E-02	9.47605E-02	.76694164	.13417584	.06	.00003229	.27912099	1.0000	.3895

K-19 PHI =160.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.30000000	2.72945E-02	7.27252E-02	.78970509	-.00000000	-.03	.06846347	.27397837	0.0000	.3753
4	2.21114440	3.34570E-02	8.31793E-02	.77	.02	.01	.06	.28362845	.0476	.4022
5	3.12229881	3.01738E-02	7.99551E-02	.78	.06	.09	.07	.27473269	.0952	.3774
6	4.03345321	3.46203E-02	8.87055E-02	.77	.05	.06	.02	.27945509	.1429	.3903
7	4.94457762	3.30413E-02	8.65995E-02	.77	.11	.06	.01	.27633908	.1905	.3818
8	5.85572202	3.37173E-02	8.82106E-02	.77	.11	.05	.00	.27649206	.2381	.3822
9	6.76686643	3.34765E-02	8.76746E-02	.77	.11	.05	.00	.27562258	.2857	.3804
10	7.67801083	3.35203E-02	8.82963E-02	.77	.11	.05	.00	.27570249	.3333	.3801
11	8.58915524	3.34657E-02	8.81962E-02	.77	.12	.05	.00	.27556228	.3810	.3797
12	9.50029964	3.35525E-02	8.80059E-02	.77	.12	.04	.00	.27535461	.4286	.3791
13	10.41144405	3.33621E-02	8.80311E-02	.77	.12	.04	.00	.27531256	.4762	.3790
14	11.32258845	3.33796E-02	8.80341E-02	.77	.12	.04	.00	.27530180	.5238	.3790
15	12.23373286	3.29764E-02	8.73962E-02	.77	.12	.04	.00	.27480391	.5714	.3776
16	13.14487726	3.21557E-02	8.57587E-02	.78	.11	.04	.00	.27378873	.6190	.3748
17	14.05602167	3.15503E-02	8.46577E-02	.78	.11	.04	.00	.27304178	.6667	.3728
18	14.96716607	3.15593E-02	8.47351E-02	.78	.11	.04	.00	.27308394	.7143	.3728
19	15.87831048	3.21093E-02	8.57317E-02	.77	.11	.04	.00	.27369026	.7619	.3745
20	16.78945488	3.28772E-02	8.71978E-02	.77	.11	.04	.00	.27460570	.8095	.3770
21	17.70059929	3.37704E-02	8.88904E-02	.77	.12	.04	.00	.27564893	.8571	.3799
22	18.61174369	3.47263E-02	9.06305E-02	.77	.12	.04	.00	.27674015	.9048	.3829
23	19.52288810	3.57950E-02	9.26758E-02	.76	.13	.04	.00	.27792943	.9524	.3862
24	20.43403250	3.64716E-02	9.39335E-02	.76	.14	.04	.00	.27866562	1.0000	.3883

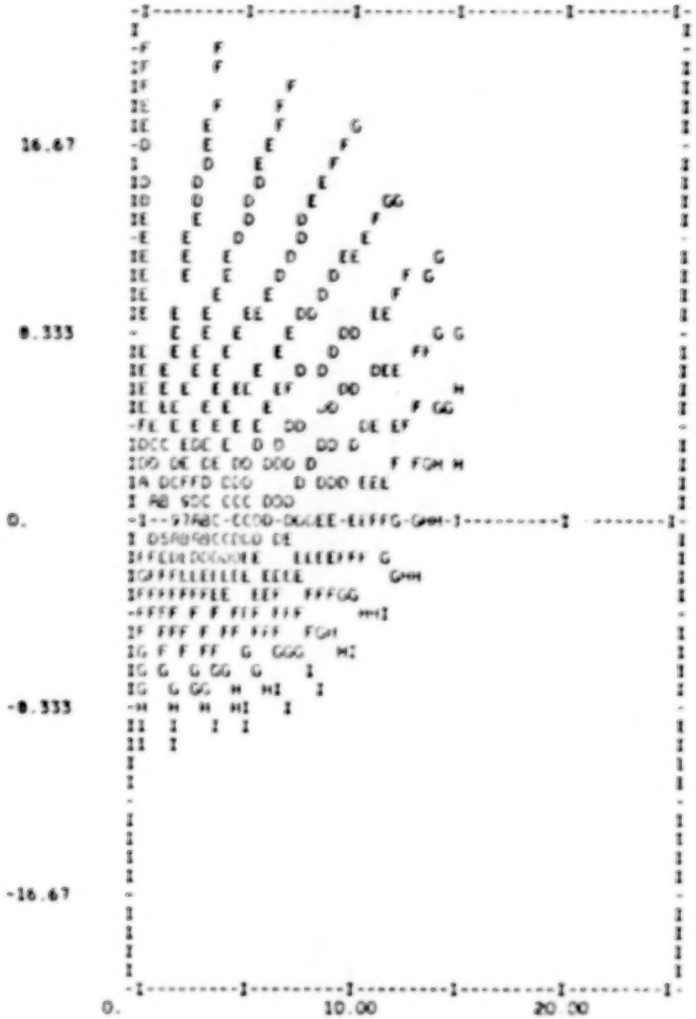
K-20 PHI =170.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S-SINF)/CV	A	T	M/MT
3	1.30000000	2.74537E-02	7.30267E-02	.78965804	-.00000000	-.02	.06846347	.27420611	0.0000	.3759
4	2.22968678	3.40079E-02	8.39089E-02	.77110265	-.00834779	.04	.04811645	.28471676	.0476	.4053
5	3.15937355	3.08348E-02	8.11865E-02	.78029850	.05	.07	.03629936	.27560930	.0952	.3798
6	4.08906033	3.54199E-02	8.98556E-02	.77350687	.08	.07	.01291907	.28077555	.1429	.3942
7	5.01874711	3.30551E-02	8.65551E-02	.77768173	.11	.06	.01651154	.27840049	.1905	.3820
8	5.94843389	3.40348E-02	8.97685E-02	.77624959	.11523076	.06	.01503360	.27691448	.2381	.3834

9	6.87812066	3.35203E-02	8.60673E-02	.77692333	.12253761	.00[illegible]	.00550490	.27590525	.2857	.3806
10	7.80780744	3.36346E-02	8.63994E-02	.77671128	.12431675	.00[illegible]	.00549530	.27585653	.3333	.3805
11	8.73349422	3.35194E-02	8.64119E-02	.77678707	.12714450	.00[illegible]	.00[illegible]	.27540864	.3810	.3798
12	9.66718100	3.35961E-02	8.66459E-02	.77732756	.12778757	.00[illegible]	.00[illegible]	.27538839	.4286	.3792
13	10.59686737	3.33966E-02	8.60746E-02	.77649353	.12620149	.00[illegible]	.00[illegible]	.27534438	.4762	.3791
14	11.52655455	3.34951E-02	8.65002E-02	.77697027	.13396678	.00[illegible]	.00[illegible]	.27547590	.5238	.3793
15	12.45624133	3.31784E-02	8.57716E-02	.77749752	.12586490	.00[illegible]	.00[illegible]	.27504564	.5714	.3782
16	13.38592811	3.23072E-02	8.61914E-02	.77970287	.12411897	.00[illegible]	.00[illegible]	.27405791	.6190	.3755
17	14.31561486	3.18693E-02	8.49.97E-02	.78160193	.12594190	.00[illegible]	.00[illegible]	.27321724	.6667	.3732
18	15.24530168	3.16[illegible]E-02	8.48[illegible]E-02	.78170742	.12781459	.00[illegible]	.00[illegible]	.27311790	.7143	.3730
19	16.17498844	3.20788E-02	8.58734E-02	.78071597	.12679527	.00[illegible]	.00[illegible]	.27365664	.7619	.3744
20	17.10467521	3.28105E-02	8.76705E-02	.77816794	.13045717	.00[illegible]	.00[illegible]	.27452665	.8095	.3764
21	18.03436199	3.36774E-02	8.87214E-02	.77515633	.13551695	.00[illegible]	.00481911	.27553979	.8571	.3796
22	18.96404877	3.46105E-02	9.04732E-02	.77228527	.14031809	.00[illegible]	.00[illegible]	.27660752	.9048	.3836
23	19.89373555	3.56340E-02	9.23810E-02	.7669[illegible]518	.14485093	.00[illegible]	.00[illegible]	.27775119	.9524	.3857
24	20.82342232	3.62503E-02	9.35269E-02	.76870858	.14742510	.00[illegible]	.00001723	.27842356	1.0000	.3876

K=21 PHI =180.0 Z = 33.800000

J	R	P	RHO	U	V	W	(S SINΦ)/CV	A	T	M/MT
3	1.30600000	2.77409E-02	7.35693E-02	.78[illegible]6913	-.00[illegible]	0.[illegible]	.04846347	.27481323	0.0000	.3771
4	2.23520657	3.43135E-02	8.50153E-02	.77[illegible]1558	-.00[illegible]	0.[illegible]	.07864281	.28412018	.0476	.4036
5	3.17053313	3.15155E-02	8.28473E-02	.785.2184	.07[illegible]9433	0.[illegible]	.02977961	.27582740	.0952	.3834
6	4.10579970	3.58104E-02	9.02544E-02	.775[illegible]1937	.08[illegible]6910	0.[illegible]	.01205978	.28011179	.1429	.3946
7	5.04106627	3.30[illegible]E-02	8.65910E-02	.77[illegible]7593	.11[illegible]553	0.[illegible]	.01601316	.27636739	.1905	.3819
8	5.97633283	3.41[illegible]E-02	8.88614E-02	.776.3945	.11[illegible]49	0.[illegible]	.01057162	.27704686	.2381	.3838
9	6.91159940	3.34926E-02	8.75466E-02	.77717377	.12766[illegible]8	0.[illegible]	.00[illegible]928	.27593485	.2857	.3807
10	7.84686596	3.36059E-02	8.84141E-02	.77672267	.12[illegible]834	0.[illegible]	.00[illegible]813	.27596136	.3333	.3808
11	8.78213253	3.37[illegible]E-02	8.87[illegible]E-02	.77665721	.12[illegible]983	0.[illegible]	.00[illegible]462	.27572809	.3810	.3801
12	9.71739910	3.39[illegible]E-02	8.91.49E-02	.77687292	.13[illegible]933	0.[illegible]	.00[illegible]60	.27551938	.4286	.3796
13	10.65266566	3.34[illegible]E-02	8.80459E-02	.77684735	.13[illegible]71	0.[illegible]	.00[illegible]656	.27541544	.4762	.3793
14	11.58793223	3.31[illegible]E-02	8.82701E-02	.77647568	.13.e9507	0.[illegible]	.00198184	.27549140	.5238	.3795
15	12.52319880	3.32191E-02	8.77631E-02	.7771[illegible]661	.13[illegible]890	0.[illegible]	.00[illegible]881	.27513946	.5714	.3785
16	13.45846536	3.24297E-02	8.62705E-02	.77[illegible]9437	.12[illegible]870	0.[illegible]	.00153890	.27417106	.6190	.3758
17	14.39373193	3.16845E-02	8.48717E-02	.78[illegible]2677	.12[illegible]5601	0.[illegible]	.00[illegible]765	.27324728	.6667	.3733
18	15.32899849	3.15[illegible]E-02	8.45619E-02	.79[illegible]5845	.12[illegible]575	0.[illegible]	.00117835	.27302126	.7143	.3727
19	16.26426506	3.19.[illegible]E-02	8.53175E-02	.78[illegible]3.58	.12[illegible]783	0.[illegible]	.00[illegible]571	.27347863	.7619	.3740
20	17.19953163	3.26213E-02	8.66958E-02	.77[illegible]6583	.13[illegible]016	0.[illegible]	.00[illegible]495	.27432507	.8095	.3763
21	18.13479819	3.34996E-02	8.83615E-02	.77[illegible]6765	.13[illegible]267	0.[illegible]	.00[illegible]58	.27534153	.8571	.3791
22	19.07006476	3.44[illegible]E-02	9.01532E-02	.775.8729	.14131.[illegible]	0.[illegible]	.00[illegible]06	.27642633	.9048	.3821
23	20.00533133	3.54[illegible]E-02	9.21[illegible]E-02	.770.8754	.14[illegible]	0.[illegible]	.00019160	.27759058	.9524	.3853
24	20.94059789	3.61138E-02	9.32745E-02	.76859582	.14885[illegible]	0.[illegible]	.00001475	.27827272	1.0000	.3872



VERTICAL SCALING

.300E-01	< 0 <	.340E-01	.340E-01	< 1 <	.380E-01
.380E-01	< 2 <	.420E-01	.420E-01	< 3 <	.460E-01
.460E-01	< 4 <	.500E-01	.500E-01	< 5 <	.540E-01
.540E-01	< 6 <	.580E-01	.580E-01	< 7 <	.620E-01
.620E-01	< 8 <	.660E-01	.660E-01	< 9 <	.700E-01
.700E-01	< A <	.740E-01	.740E-01	< B <	.780E-01
.780E-01	< C <	.820E-01	.820E-01	< D <	.860E-01
.860E-01	< E <	.900E-01	.900E-01	< F <	.940E-01
.940E-01	< G <	.980E-01	.980E-01	< H <	.102
.102	< I <	.106			

SURFACE FLOW VARIABLES AT Z = 33.800000
X/L = 1.000000 DZDT= 3.350363 ITER= 626

PHI	RB	CP	P/PINF	R/RINF	M-Z	M-R	M PHI	A	COMP	H/HT	TEMP	(S-S.INF)/CV
0.0	1.3000	.0259	1.1485E+00	1.0512E+00	2.6578	-.0000	0.0000	2.8791E-01	1.0000	.41446	.00	6.8463E-02
10.0	1.3000	.0227	1.1360E+00	1.0392E+00	2.6650	-.0000	.1321	2.8724E-01	1.0000	.41255	.00	6.8463E-02
20.0	1.3000	.0136	1.0781E+00	1.0347E+00	2.6858	-.0000	.2653	2.8532E-01	1.0000	.40703	.00	6.8463E-02
30.0	1.3000	-.0007	9.9626E-01	9.9470E-01	2.7207	-.0000	.4024	2.8212E-01	1.0000	.39796	.00	6.8463E-02
40.0	1.3000	-.0192	8.9025E-01	8.7639E-01	2.7705	-.0000	.5465	2.7762E-01	1.0000	.38537	.00	6.8463E-02
50.0	1.3000	-.0401	7.7045E-01	7.6044E-01	2.8346	.0000	.6976	2.7195E-01	1.0000	.36978	.00	6.8463E-02
60.0	1.3000	-.0636	6.3583E-01	6.2311E-01	2.9235	.0000	.8687	2.6419E-01	1.0000	.35004	.00	6.8463E-02
70.0	1.3000	-.0861	5.0674E-01	5.0602E-01	3.0192	.0000	1.0408	2.5615E-01	1.0000	.32804	.00	6.8463E-02
80.0	1.3000	-.0985	4.3696E-01	5.2711E-01	3.0950	.0000	1.1948	2.5079E-01	1.0000	.31446	.00	6.8463E-02
90.0	1.3000	-.0894	4.8044E-01	5.7458E-01	3.0658	.0000	.9440	2.5478E-01	1.0000	.32456	.00	6.8463E-02
100.0	1.3000	-.0466	7.3318E-01	7.6350E-01	2.8994	.0000	.5589	2.7004E-01	1.0000	.36461	.00	6.8463E-02
110.0	1.3000	-.0111	9.3635E-01	9.0478E-01	2.7834	.0000	.2478	2.7967E-01	1.0000	.39097	.00	6.8463E-02
120.0	1.3000	-.0119	9.3.08E-01	9.0528E-01	2.7916	.0000	.1100	2.7995E-01	1.0000	.39046	.00	6.8463E-02
130.0	1.3000	-.0178	8.9835E-01	8.8204E-01	2.8180	-.0000	.0657	2.7796E-01	1.0000	.38636	.00	6.8463E-02
140.0	1.3000	-.0265	8.4848E-01	8.4482E-01	2.8548	-.0000	-.0424	2.7572E-01	1.0000	.38012	.00	6.8463E-02
150.0	1.3000	-.0310	8.2276E-01	8.2940E-01	2.8738	-.0000	-.1052	2.7451E-01	1.0000	.37679	.00	6.8463E-02
160.0	1.3000	-.0329	8.1159E-01	8.2034E-01	2.8824	-.0000	-.1180	2.7396E-01	1.0000	.37532	.00	6.8463E-02
170.0	1.3000	-.0321	8.1632E-01	8.2377E-01	2.8798	-.0000	-.0812	2.7421E-01	1.0000	.37599	.00	6.8463E-02
180.0	1.3000	-.0306	8.2488E-01	8.2991E-01	2.8741	-.0000	0.0000	2.7461E-01	1.0000	.37706	.00	6.8463E-02

BODY AND SHOCK GEOMETRY A Z =33.800

PHI	RB	DRB/DZ	DRB/DPHI	RS	DRS/DZ	DRS/DPHI
0.0	1.3000	0.0000	0.0000	9.7928	.2270	0.0000
10.0	1.3000	0.0000	0.0000	9.8430	.2288	.5765
20.0	1.3000	0.0000	0.0000	9.9940	.2334	1.1618
30.0	1.3000	0.0000	0.0000	10.2495	.2414	1.7620
40.0	1.3000	0.0000	0.0000	10.6091	.2530	2.3767
50.0	1.3000	0.0000	0.0000	11.0792	.2682	3.0097
60.0	1.3000	0.0000	0.0000	11.6557	.2873	3.6488
70.0	1.3000	0.0000	0.0000	12.3539	.3107	4.2892
80.0	1.3000	0.0000	0.0000	13.1499	.3371	4.9830
90.0	1.3000	0.0000	0.0000	14.0194	.3675	5.3593
100.0	1.3000	0.0000	0.0000	15.0207	.4007	5.7283
110.0	1.3000	0.0000	0.0000	16.0459	.4358	5.9423
120.0	1.3000	0.0000	0.0000	17.0949	.4720	5.8816
130.0	1.3000	0.0000	0.0000	18.1010	.5046	5.5825
140.0	1.3000	0.0000	0.0000	19.0356	.5387	4.9319
150.0	1.3000	0.0000	0.0000	19.8258	.5660	4.0035
160.0	1.3000	0.0000	0.0000	20.4340	.5846	2.8644
170.0	1.3000	0.0000	0.0000	20.8234	.5999	1.4512
180.0	1.3000	0.0000	0.0000	20.9406	.6040	0.0000

REFERENCE

1. Chaussee, D. S.; and McMillan, O. J.: A Supersonic, Three-Dimensional Code for Flow Over Blunt Bodies - User's Manual. NASA CR-3223, 1980.

APPENDIX

SOURCE CODE

```
      PROGRAM MAIN(INPUT,OUTPUT,PUNCH,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7=PUN MAIN      2
     *CH,TAPE9,TAPE11,TAPE12,TAPE13)                                     MAIN      3
      LEVEL 2,ETEMP,EO,FO,GO,HO                                          CVARB     2
      COMMON/LARGE/ ETEMP(4,24,41),EO(4,24,41),                          CVARB     3
     *      FO(4,24,41)     , GO(4,24,41) , HO(4,24,41)                  CVARB     4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB     2
     *1) ,                                                               PVARB     3
     *      ROB(41)     , ROBZ(41) , VINF(41) , WINF(41) ,               PVARB     4
     *      ROBPH(41)   ,            RO(41)    , ROZ(41)   , ROPH(41) ,  PVARB     5
     *     DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,     PVARB     6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NREGN    , RS(41)    ,    PVARB     7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)     PVARB     8
      COMMON /IDVARB/RK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DELTA,TP(24) IDVARB    2
      COMMON/SVARB/T,Z     , PHI   , DT    , DZ    , IPHI  , ZINT  ,     SVARB     2
     *      ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,      SVARB     3
     *      TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,      SVARB     4
     *      DZDPH , ZM    , TMLD  , TMLD  , TMU   , TML   , TTMU  ,      SVARB     5
     *      TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,      SVARB     6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,      SVARB     7
     *      NT    , NT1   , NT2   , NT3   , PHIFD , NCTR4 , NNDI  ,      SVARB     8
     *      PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,      SVARB     9
     *      GINF,DIAM,ALINIT,ZFIF,ZCG,ZSHIFT,IFREDM                      SVARB    10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                    SVARB    11
      COMMON /LIBCO/NLIST(11),XCRIT,XLVXX(4),NCRTB(3),NSWCH(52),INC(52)  LIBCO     2
      COMMON/XYZ/XLXXX(5),X1(160),X2(160),X3(160),Y1(160),Y2(160),Y3(160 XYZ       2
     *),Z4(160),Z2(160),Z3(160)                                          XYZ       3
      COMMON/ZLE/ZL1,CF1,CF2,ZLF,ZTRAN,DZTRAN                            ZLE       2
      COMMON/EPSL/EPSL1,EPSL2                                            EPSL      2
      COMMON/REALG/REAL,NWHPT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF      REALG     2
     *,V1INF,NITREG,NWHIT                                                REALG     3
      COMMON/COMPS/WRPO,WRRO,WRTO,WRCON,GASCON,WRHO,WRSO,WRAO,WRHTO,WRGA COMPS     2
      COMMON/ENTRO/S(41),ZOS,ZFLD,ITPRTB,ITPRTF,NCASE,NTDSOS             ENTRO     2
      COMMON/CFS/NCFS                                                    CFS       2
      COMMON/CLUSTR/RJ,XI(24),TXI(24),TXII(24)                           CLUSTR    2
      DIMENSION XYSI(3)                                                  MAIN     17
      DIMENSION YBK(2),YS(24)                                            MAIN     18
   11 CONTINUE                                                           MAIN     19
      IPRNT=ICONST(4)                                                    MAIN     20
      CALL GEOMS(O,PHIP,NPHI,Z,RB,RBZ,RBPH,IPRNT,NCONE)                  MAIN     21
      CALL INPUT                                                         MAIN     22
      GASCON=1716.                                                       MAIN     23
    9 IF(DISK1.GT.1) GO TO 1                                             MAIN     24
      READ (12) XMACH,ALPHA,GAMMA,NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASC MAIN     25
     *ON,RK,PHIFD,RJ                                                     MAIN     26
    1 IF(DISK2.GT.1) GO TO 2                                             MAIN     27
      READ (11) XMACH,ALPHA,GAMMA,NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASC MAIN     28
     *ON,RK,PHIFD,RJ                                                     MAIN     29
2     IF(TAPE2.EQ.1.OR.TAPE2.EQ.3) GO TO 3                               MAIN     30
      READ (5,112) XMACH,ALPHA,GAMMA,RK,PHIFD                            MAIN     31
      READ(5,112) RJ                                                     MAIN     32
      READ (5,113) NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASCON              MAIN     33
3     CONTINUE                                                           MAIN     34
      ZINT=ZL1                                                           MAIN     35
      ZEND=ZLF                                                           MAIN     36
      SIGMA=ATAN(CF2)*57.29578                                           MAIN     37
      ZTINT=ZINT                                                         MAIN     38
      ICONST(48)=0                                                       MAIN     39
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            IF (NREAL.NE.0) CALL INITIL                                          MAIN   40
          7 CALL INITA                                                           MAIN   41
 60       C.....CALCULATES COEFFICIENTS FOR STARTUP(FIRST CARD BEFORE ZALTER CARD MAIN   42
            IF(NCONE .EQ. 2 .AND. IFANOM .EQ. 0)CALL AEROD(1)                    MAIN   43
            IEND=0                                                               MAIN   44
            DDZZ=(ZEND-ZINT)/500.0                                               MAIN   45
            ZZZ=ZINT                                                             MAIN   46
 65       C.....READ RESPACING PARAMETERS                                        MAIN   47
          C                                                                      MAIN   48
          C      ZALTER = ZSTATION WHERE ALTERING OCCURS                         MAIN   49
          C      NJ,NK  = NUMBER OF POINTS IN RADIAL AND MERIDIONAL DIRECTIONS   MAIN   50
          C      RJA,RKA = AMOUNT OF CLUSTERING IN RADIAL AND MERIDIONAL DIRECTIONS MAIN 51
 70       C      PHIFDA = MERIDIONAL ANGLE ABOUT WHICH CLUSTERING OCCURS         MAIN   52
          C      STPSIZE = 0.,AUTOMATIC STEPSIZER ; >0. CONSTANT STEPSIZE        MAIN   53
          CCONST(40)S) = THE AMOUNT OF DISSIPATION IN RADIAL AND MERIDIONAL DIREC MAIN   54
          C                 I.E.  .03                                          MAIN   55
          C      NSWCH1=0,NEW AVERAGING SCHEME,=1,REGULAR SCHEME                 MAIN   56
 75       C      NSWCH2=0,NO ENTROPY RELAXATION,=1,RELAXATION                    MAIN   57
          C                                                                      MAIN   58
            READ(5,100)ZALTER,NITA,NIPHIA,RJA,RKA,PHIFDA,STP,DISS1,DISS2,       MAIN   59
           *          NSWCH1,NSWCH2                                            MAIN   60
            STPSIZE=0.0                                                          MAIN   61
 80         CALL ENTRY(2)                                                        MAIN   62
            CALL EIGEN(1)                                                        MAIN   63
          C.....OUTPUT INITIAL FLOW VARIABLES                                    MAIN   64
            ICONST(5)=0                                                          MAIN   65
            IF(NCONE.EQ.1) GO TO 15                                              MAIN   66
 85         CALL OUTPUT(2)                                                       MAIN   67
            CALL OUTPUT(5)                                                       MAIN   68
            CALL OUTPUT(6)                                                       MAIN   69
         15 CONTINUE                                                             MAIN   70
          C.....CONE AT ZERO ALPHA BYPASS                                        MAIN   71
 90         IF(NCONE.EQ.1.AND.ALPHA.EQ.0.0.OR.NITER.EQ.0) GO TO 16               MAIN   72
            DO 4 JADI=1,NITER                                                    MAIN   73
            ICONST(5)=JADI                                                       MAIN   74
            IF(STPSIZE .EQ. 0.)GO TO 10227                                       MAIN   75
            DZ=STPSIZE                                                           MAIN   76
 95         DZDT=DZ/DT                                                           MAIN   77
            DZDTH=DZ/DETA                                                        MAIN   78
            GO TO 5                                                              MAIN   79
          10227 CONTINUE                                                         MAIN   80
          C.....COMPUTE AUTOMATIC STEPSIZE                                       MAIN   81
100         IF (MAX(JADI,ICONST(40)).NE.0) GO TO 5                               MAIN   82
            IF (JADI.EQ.1) GO TO 5                                               MAIN   83
            CALL ENTRY(1)                                                        MAIN   84
          5 CONTINUE                                                             MAIN   85
          C.....GENERATES DATA TAPE                                              MAIN   86
105         GO TO (34,35,35), TAPE1                                              MAIN   87
          35 CONTINUE                                                            MAIN   88
            IF(Z.LT.ZZZ) GO TO 34                                                MAIN   89
            ZZZ=Z+DDZZ                                                           MAIN   90
            CALL OUTPUT(3)                                                       MAIN   91
110       34 CONTINUE                                                            MAIN   92
            IF(Z+DZ .LT. ZEND)GO TO 30                                           MAIN   93
            IF(IEND .EQ. 1)GO TO 19                                              MAIN   94
            DZ=ZEND-Z                                                            MAIN   95
            DZDT=DZ/DT                                                           MAIN   96
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                      DZDPH=DZ/DETA                                              MAIN       97
                      IEND=1                                                     MAIN       98
                30    CONTINUE                                                   MAIN       99
                      IF(ZALTER.GE.Z.AND.ZALTER.LT.(Z+DZ)) GO TO 10              MAIN      100
                      GO TO 8                                                    MAIN      101
C.....CLUSTER POINTS IN RADIAL OR MERIDIONAL DIRECTIONS                          MAIN      102
10    CONTINUE                                                                   MAIN      103
      CALL OUTPUT(5)                                                             MAIN      104
      CALL SETSPC(NITA,RJA,NIPHIA,RKA,PHIFDA)                                    MAIN      105
      STPSZE=STP                                                                 MAIN      106
      CONST(4)=DISS1                                                             MAIN      107
      CONST(5)=DISS2                                                             MAIN      108
      NSWCH(5)=NSWCH5                                                            MAIN      109
      NSWCH(11)=NSWCH1                                                           MAIN      110
      READ(5,100)ZALTER,NITA,NIPHIA,RJA,RKA,PHIFDA,STP,DISS1,DISS2,              MAIN      111
     <          NSWCH1,NSWCH5                                                   MAIN      112
      IF(STPSZE .EQ. 0.0)CALL EIGEN(1)                                           MAIN      113
      CALL OUTPUT(5)                                                             MAIN      114
8     CONTINUE                                                                   MAIN      115
      CALL DIFFR                                                                 MAIN      116
      IF(NCONE .EQ. 2 .AND. IFANDM .EQ. 0)CALL ARCOD(2)                          MAIN      117
C.....OUTPUT INTERMEDIATE DATA                                                   MAIN      118
C...OUTPUT BASED ON ITERATIONS                                                   MAIN      119
      IF(MOD(JUDI,IIPRTF).NE.0) GO TO 21                                         MAIN      120
      CALL OUTPUT(2)                                                             MAIN      121
   21 IF(MOD(JUDI,IIPRTB).NE.0) GO TO 20                                         MAIN      122
      CALL OUTPUT(5)                                                             MAIN      123
      CALL OUTPUT(6)                                                             MAIN      124
   20 CONTINUE                                                                   MAIN      125
C...OUTPUT BASED ON Z STATIONS                                                   MAIN      126
      IF(AMOD(Z,ZFLD).LE.DZ) CALL OUTPUT(2)                                      MAIN      127
      IF(AMOD(Z,ZBS).LE.DZ) GO TO 12                                             MAIN      128
      GO TO 4                                                                    MAIN      129
12    CONTINUE                                                                   MAIN      130
      CALL OUTPUT(5)                                                             MAIN      131
      CALL OUTPUT(6)                                                             MAIN      132
4     CONTINUE                                                                   MAIN      133
   19 CONTINUE                                                                   MAIN      134
C                                                                                MAIN      135
C.....RESET CONE SOLUTION TO Z-ZINT                                              MAIN      136
      IF(NCONE.EQ.2) GO TO 16                                                    MAIN      137
      ZR=(ZTINT-ZSHIFT)/(Z-ZSHIFT)                                               MAIN      138
      DO 14 K=1,NPHI2                                                            MAIN      139
      RB(K)=ZR*RB(K)                                                             MAIN      140
      RS(K)=ZR*RS(K)                                                             MAIN      141
      RBPHI(K)=ZR*RBPHI(K)                                                       MAIN      142
   14 RSPHI(K)=ZR*RSPHI(K)                                                       MAIN      143
      Z=ZTINT                                                                    MAIN      144
      CALL GEOM1(2)                                                              MAIN      145
      WRITE(6,102) Z                                                             MAIN      146
   16 CONTINUE                                                                   MAIN      147
C.....OUTPUT FINAL DATA                                                          MAIN      148
      CALL OUTPUT(2)                                                             MAIN      149
      CALL OUTPUT(5)                                                             MAIN      150
      CALL OUTPUT(6)                                                             MAIN      151
      ZSAVE=ZEND                                                                 MAIN      152
      ZEND=ZTINT                                                                 MAIN      153
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                IF(NCONE .EQ. 1 .AND. IFANOM .EQ. 0)CALL REACO(1)                MAIN      154
                IF(IFANOM .EQ. 0)CALL REACO(2)                                   MAIN      155
                ZERO=ZSAVE                                                       MAIN      156
175         C.....STORE SOLUTION ON PUNCHED CARDS                                MAIN      157
                IF(TAPE2.EQ.3) CALL OUTPUT(8)                                    MAIN      158
            C.....STORE SOLUTION ON DISK1 FOR RESTART                            MAIN      159
                IF(DISK1.NE.2) GO TO 17                                          MAIN      160
                CALL OUTPUT(4)                                                   MAIN      161
180           17 CONTINUE                                                        MAIN      162
            C.....STORE SOLUTION ON DISK2 FOR RESTART                            MAIN      163
                IF(DISK2.NE.2) GO TO 18                                          MAIN      164
                CALL OUTPUT(7)                                                   MAIN      165
              18 CONTINUE                                                        MAIN      166
185          100 FORMAT(F10.5,I2,I3,6F10.5,I2,I3)                                MAIN      167
             102 FORMAT(* CONE SOLUTION RESET TO Z-INITIAL=*,F10.5)              MAIN      168
            112  FORMAT(5E15.6)                                                  MAIN      169
            113  FORMAT(3I5,4E15.6)                                              MAIN      170
            6    ZZZ=ZZZ                                                         MAIN      171
190             IF (TAPE1.EQ.1) GO TO 13                                         MAIN      172
                END FILE 9                                                       MAIN      173
                REWIND 9                                                         MAIN      174
             13 CONTINUE                                                         MAIN      175
                IF(NCASE.GT.0) GO TO 11                                          MAIN      176
195         C.....PUNCH DATA CARDS FOR 3-D 5-D-5 CODE                            MAIN      177
                IF(NTOSDS.GT.0) CALL OUTPUT(9)                                   MAIN      178
                STOP                                                             MAIN      179
                END                                                              MAIN      180
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M

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SUBROUTINE AERCO      76/76   OPT=1                    FTN 4.6+460        06/15/79  18.58.36      PAGE     1

 1                SUBROUTINE AERCO(K1)                                                    AERCO      2
                  COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4    PVARB      2
                 *1) ,                                                                   PVARB      3
                  *       ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                  PVARB      4
 5                *       ROBPH(41)  ,            FB(41)   , RBZ(41)  , RBPH(41) ,     PVARB      5
                  *      DTOPH(24,41), BCT(41)  ,DTOZ(24,41),DTER(41) , RCT(41)  ,     PVARB      6
                  *       ICONST(50) , GRM(20)  , CONST(50) ,NREC.N    , RS(41)   ,     PVARB      7
                  *       RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)      PVARB      8
                  COMMON /IDATA/PK,ETA(41),PHIP(41),DTIL(41),CTILE(41),DETA,IP(24)      IDATA      2
10                COMMON/SVARB/T,Z     , PHI    , DT     , DZ     , DPHI   , ZINT   ,   SVARB      2
                  *       ZERO , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,       SVARB      3
                  *       TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,      SVARB      4
                  *       DZDPH , ZM    , TMAX  , TMID  , TMN   , TMB   , TTMN  ,     SVARB      5
                  *       TIME  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,     SVARB      6
15                *       NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHP2 , NPHP3 ,     SVARB      7
                  *       NT    , NT1   , NT2   , NT3   , PHIPD , NCONE , RMAX  ,     SVARB      8
                  *       PHIF  , METHOD, LAG   , TRC   , PIN   , RHOIN , UINF  ,     SVARB      9
                  *       GINF,DIAM,RLENGT,ZNEF,ZCG,ZSHIFT,IPARAM                      SVARB     10
                  INTEGER D,W1,DISK2,TAPE1,TAPE2                                        SVARB     11
20                COMMON/ENTRO/S(41),ZBS,ZFLD,ITAPTB,ITRATF,NCASE,NTUSOS              ENTRO      2
                  COMMON/CYCLES/ZZ(3),CPS(41),RHBS(41),RVLPH(41),RHBZ(41)             RCYC       7
                  COMMON/FNORM/FIX,FIY,FIZ,RMIX,RMIY,RMIZ,FIX2,FIY2,FIZ2,RMIX2,RMIY2 RNRO       8
                 *,RMIZ2                                                              RNRO       9
                  RETE LENGTH                                                         RERCO     10
25          C..NO YAW OR ROLL CAPABILITY,3/15/78                                      RERCO     11
                  BETA=0.0                                                            RERCO     12
                  ROLL=0.0                                                            RERCO     13
                  ZO=Z+DZ                                                             RERCO     14
                  GRM(5)=2./(GAMMA*XMACH**2)                                          RERCO     15
30                ZZ(3)=Z                                                             RERCO     16
                  GO TO (5,3),K1                                                      RERCO     17
            C.....PIECEWISE SUMMATION OF FORCES AND MOMENTS                           RERCO     18
             3    IF(ZO.GE. ZERO)ZZ(3)=ZERO                                           RERCO     19
                  CALL COMPUT(NSTART)                                                 RERCO     20
35                NSTART=2                                                            RERCO     21
                  ZZ(1)=ZZ(2)                                                         RERCO     22
                  ZZ(2)=ZZ(3)                                                         RERCO     23
                  IF(NCONE .EQ. 1)GO TO 7                                             RERCO     24
                  GO TO 10                                                            RERCO     25
40          C.....INITIALIZES THE FORCES AND MOMENTS FOR EACH STARTUP                 RERCO     26
             5    CONTINUE                                                            RERCO     27
                  ZZ(1)=ZZ(3)                                                         RERCO     28
                  ZZ(2)=ZZ(3)                                                         RERCO     29
                  NSTART=1                                                            RERCO     30
45                CALL COMPUT(NSTART)                                                 RERCO     31
                  NSTART=2                                                            RERCO     32
                  ZSTART=Z                                                            RERCO     33
                  LENGTH=RLENGT                                                       RERCO     34
                  SB=PI*DIAM**2/4.0                                                   RERCO     35
50                WRITE(6,105)SB,LENGTH                                               RERCO     36
             10   DO 15 K=3,NPHI                                                      RERCO     37
                  CPS(K)=(P(3,K)/PINF-1.0)*GRM(5)                                     RERCO     38
                  RHB(K)=RO(K)                                                        RERCO     39
                  RHBPH(K)=ROPH(K)                                                    RERCO     40
55                RHBZ(K)=ROZ(K)                                                      RERCO     41
             15   CONTINUE                                                            RERCO     42
                  IF(Z .EQ. ZSTART)RETURN                                             RERCO     43
```

```
      7   CONTINUE                                                          AERCO   44
      C.....COMPUTE AERODYNAMIC COEFFICIENTS                                AERCO   45
60          REF1=2./SB                                                      AERCO   46
            FTX1=FTX2*REF1                                                  AERCO   47
            FTY1=FTY2*REF1                                                  AERCO   48
            FTZ1=FTZ2*REF1                                                  AERCO   49
            FTX=FTX+FTX1                                                    AERCO   50
65          FTY=FTY+FTY1                                                    AERCO   51
            FTZ=FTZ+FTZ1                                                    AERCO   52
      C.....COMPUTE AERODYNAMIC MOMENT COEFFICIENTS                         AERCO   53
            REF2=2./(SB*LENGTH)                                             AERCO   54
            RMTX1=RMTX2*REF2                                                AERCO   55
70          RMTY1=RMTY2*REF2                                                AERCO   56
            RMTZ1=RMTZ2*REF2                                                AERCO   57
            RMTX=RMTX+RMTX1                                                 AERCO   58
            RMTY=RMTY+RMTY1                                                 AERCO   59
            RMTZ=RMTZ+RMTZ1                                                 AERCO   60
75          WRITE(6,101)Z,FTX1,FTY1,FTZ1,FTX,FTY,FTZ,RMTX1,RMTY1,RMTZ1,RMTX,  AERCO   61
           *RMTY,RMTZ                                                       AERCO   62
      20    CONTINUE                                                        AERCO   63
            IF(ZZ(3).LT. ZERO)RETURN                                        AERCO   64
      C.....PRINT OUT FINAL AERODYNAMIC FORCE AND MOMENT COEFFICIENTS        AERCO   65
80    C.....CALCULATE LIFT,DRAG,AND YAW FORCES(WIND AXES, AND STATIC MARGIN  AERCO   66
            A1=ALPH                                                         AERCO   67
            A2=BETA                                                         AERCO   68
            A3=ROLL                                                         AERCO   69
            CD=FTZ*COS(A1)*COS(A2)-FTX*COS(A1)*SIN(A2)+FTY*SIN(A1)          AERCO   70
85          CY=FTZ*(SIN(A2)*COS(A3)-SIN(A1)*COS(A2)*SIN(A3))+FTX*(COS(A2)*  AERCO   71
           *COS(A3)+SIN(A1)*SIN(A2)*SIN(A3))+FTY*SIN(A3)*COS(A1)            AERCO   72
            CL=-FTZ*(SIN(A2)*SIN(A3)+SIN(A1)*COS(A2)*COS(A3))+FTY*COS(A1)*  AERCO   73
           *COS(A2)+FTX*(-SIN(A3)*COS(A2)+SIN(A1)*SIN(A2)*COS(A3))          AERCO   74
            WRITE(6,105)SB,LENGTH                                           AERCO   75
90          WRITE(6,102)FTY,CL,FTX,CY,FTZ,CD                                AERCO   76
            RMTY=-RMTY                                                      AERCO   77
            RMTZ=-RMTZ                                                      AERCO   78
            WRITE(6,104)RMTX,RMTY,RMTZ                                      AERCO   79
            ZCP=-RMTX/FTY                                                   AERCO   80
95          SM=ZCP-ZCG/LENGTH                                               AERCO   81
            WRITE(6,106)ZCP,LENGTH,ZREF                                     AERCO   82
            WRITE(6,107)SM,LENGTH,ZCG                                       AERCO   83
            WRITE(6,108)                                                    AERCO   84
         8  CONTINUE                                                        AERCO   85
100   101   FORMAT(1X,2HZ=,F10.6/1X,21HDCY,DCN,DCA,CY,CN,CA=,8E15.8 /1X,2HDMX  AERCO   86
           *,DMY,DMZ,CMX,CMY,CMZ=,8E15.8)                                   AERCO   87
      102   FORMAT(1HO,5X,27HNORMAL FORCE COEFFICIENT =,E15.6,10X,19HLIFT COE  AERCO   88
           *FFICIENT =,E15.6//6X,27H  SIDE FORCE COEFFICIENT =,E15.6,10X,19H  AERCO   89
           *YAW  COEFFICIENT =,E15.6//6X,27H AXIAL FORCE COEFFICIENT =,E15.6  AERCO   90
105        *,10X,19H,RAG COEFFICIENT =,E15.6)                               AERCO   91
      104   FORMAT(1HO,/6X,30HPITCHING MOMENT COEFFICIENT =,E15.6//          AERCO   92
           *6X,30H    SIDE MOMENT COEFFICIENT =,E15.6//                     AERCO   93
           *6X,30H ROLLING MOMENT COEFFICIENT =,E15.6)                      AERCO   94
      105   FORMAT(1H1,5X,12HREF. AREA =,F10.6,1X,19HREF. LENGTH =,F10.6)    AERCO   95
110   106   FORMAT(1HO,/6X,19HCENTER OF PRESSURE=,E15.6,1X,21HBASED ON REF. LE  AERCO   96
           *NGTH=,E15.6,1X,23HAND MOMENT REF. CENTER=,E15.6)                AERCO   97
      107   FORMAT(1HO,6X,26HSTATIC STABILITY MARGIN =,E15.6,1X,23HBASED ON R  AERCO   98
           *EF. LENGTH =,E15.6,1X,20HAND C.G. LOCATION =,E15.6)             AERCO   99
      108   FORMAT(1H1,7HTHE END)                                           AERCO  100
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115                RETURN                                          AERCO  101
                   END                                             AERCO  102
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      SUBROUTINE COMPUT (NSTART)                                                COMPUT     2
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB     2
     *1) ,                                                                      PVARB     3
     *      ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                       PVARB     4
     *      RGBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,          PVARB     5
     *     DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDP(41) , ACT(41)  ,          PVARB     6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NRELOW   , RS(41)   ,          PVARB     7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)          PVARB     8
      COMMON /IDVARB/PR,ETA(41),PHIP(41),DTIL(41),DTILR(41),DELTA,TP(24)        IDVARB    2
      COMMON/SVARB/T,Z     , PHI    , DT     , DZ     , DPHI   , ZINT   ,     SVARB     2
     *      ZERO   , PI    , ALPHA , GAMMA , SIGMA , DYNAMN , TAPE1 ,        SVARB     3
     *      TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRINT , DZDT  ,         SVARB     4
     *      DZDPH , ZM    , TMAD  , TMLD  , TMU   , TML    , TTMU  ,        SVARB     5
     *      TTML  , PZ    , BZ    , NPHI  , NIT   , KPHI   , NITER ,        SVARB     6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2  , NPHM3 ,        SVARB     7
     *      NT    , NT1   , NT2   , NT3   , PHIPD , NCORE  , RHOI  ,        SVARB     8
     *      PHIF  , METHOD, LAG   , NPC   , PINF  , RHOIN  , UINF  ,        SVARB     9
     *      QINF,DIAM,ALENGT,ZREF,ZCG,ZSHIFT,IFRCOM                           SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                           SVARB     11
      COMMON/FORCES/ZZ(3),CPS(41),RHOB(41),RPBPH(41),RPBZ(41)                   COMPUT    6
      COMMON/FORCEM/FTX,FTY,FTZ,RMTX,RMTY,RMTZ,FTX2,FTY2,FTZ2,RMT*2,RMT*2 COMPUT    7
     *  ,RMTZ2                                                                 COMPUT    8
      REAL MTEMPX,MTEMPY,MTEMPZ                                                 COMPUT    9
      DZ1=(ZZ(3)-ZZ(2))*0.5                                                     COMPUT    10
      DZ2=(ZZ(2)-ZZ(1))*0.5                                                     COMPUT    11
      FTEMPX=0.0                                                                COMPUT    12
      FTEMPY=0.0                                                                COMPUT    13
      FTEMPZ=0.0                                                                COMPUT    14
      MTEMPX=0.0                                                                COMPUT    15
      MTEMPY=0.0                                                                COMPUT    16
      MTEMPZ=0.0                                                                COMPUT    17
      DO 4 K=3,NPHI                                                             COMPUT    18
      SPHI=SIN(PHIP(K))                                                         COMPUT    19
      CPHI=COS(PHIP(K))                                                         COMPUT    20
      GO TO (1,2),NSTART                                                        COMPUT    21
    1 CONTINUE                                                                  COMPUT    22
C.....FORCE AND MOMENT FROM STARTING SOLUTION                                   COMPUT    23
      READ(5,200)FTX,FTY,FTZ,RMTX,RMTY,RMTZ                                     COMPUT    24
      H=ZINT-ZSHIFT                                                             COMPUT    25
      RC=H*TAN(SIGM)                                                            COMPUT    26
  200 FORMAT(6F12.8)                                                            COMPUT    27
      RETURN                                                                    COMPUT    28
    2 CONTINUE                                                                  COMPUT    29
C.....AFT BODY CALCULATIONS                                                     COMPUT    30
      DPHIS=PHIP(K+1)-PHIP(K-1)                                                 COMPUT    31
      IF(K .EQ. 4)DPHIS=2.*(PHIP(K)-PHIP(K-1))                                  COMPUT    32
      AA=(DZ1+DZ2)*RB(K)*0.5*DPHIS                                              COMPUT    33
      IF(NOSE .EQ. 1)AA=0.5*(PHIS*0.5*RD*SQRT(RD**2+HPP2)                       COMPUT    34
      IF(K .EQ. 3 .OR. K .EQ. NPHI)AA=0.5*AA                                    COMPUT    35
      FORCE=CPS(K)*AA                                                           COMPUT    36
      ZARM=ZZ(2)-ZREF                                                           COMPUT    37
      IF(NOSE .EQ. 1)ZARM=2.*(ZINT-ZSHIFT)*(1.+TAN(SIGM)**2)/3.+ZSHIFT COMPUT    38
     *-ZREF                                                                     COMPUT    39
      FTEMPX=FTEMPX+FORCE*(RBPH(K)/RHOB(K)*CPHI-SPHI)                           COMPUT    40
      FTEMPY=FTEMPY+FORCE*(RBPH(K)/RHOB(K)*SPHI+CPHI)                           COMPUT    41
      FTEMPZ=FTEMPZ+FORCE*RBZ(K)                                                COMPUT    42
C.....MOMENT CENTER LOCATED AT Z=ZREF                                           COMPUT    43
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                MTEMPX=MTEMPX-FORCE*(ZARM *ARBPH(K)*SPHI/ARB(K)+(ZARM *ARB(K)*    COMPUT   44
               <ARBZ(K))*CPHI)                                                    COMPUT   45
60              MTEMPY=MTEMPY+FORCE*(ZARM *ARBPH(K)*CPHI/ARB(K)-(ZARM *ARB(K)*    COMPUT   46
               <ARBZ(K))*SPHI)                                                    COMPUT   47
                MTEMPZ=MTEMPZ+FORCE*ARBPH(K)                                      COMPUT   48
              4 CONTINUE                                                          COMPUT   49
                FTX2=FTEMPX                                                       COMPUT   50
65              FTY2=FTEMPY                                                       COMPUT   51
                FTZ2=FTEMPZ                                                       COMPUT   52
                RMTX2=MTEMPX                                                      COMPUT   53
                RMTY2=MTEMPY                                                      COMPUT   54
                RMTZ2=MTEMPZ                                                      COMPUT   55
70              RETURN                                                            COMPUT   56
                END                                                               COMPUT   57
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      SUBROUTINE BNDRY(K1)                                                  BNDRY    2
      LEVEL 2,ETEMP,EO,FO,GO,HO                                             CVARB    2
      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                              CVARB    3
     *     FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                       CVARB    4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4    PVARB    2
     *1) ,                                                                  PVARB    3
     *     ROB(41)    , RSBZ(41) , VINF(41) , WINF(41) ,                    PVARB    4
     *     RSBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,        PVARB    5
     *    DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,       PVARB    6
     *     ICONST(50) , GAM(20)  , CONST(50) ,NREGON   , RS(41)   ,       PVARB    7
     *     RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)       PVARB    8
      COMMON /IDVARB/RK,ETA(41),PHIP(41),DTIL(41),DTILF(41),DETA,TP(24)     IDVARB   2
      COMMON/SVARB/T,Z     , PHI   , DT    , DZ    , DPHI  , ZINT  ,      SVARB    2
     *     ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,       SVARB    3
     *     TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZ.T  ,       SVARB    4
     *     DZLPH , ZM    , TMAD  , TMLD  , TMW   , TML   , TTMW  ,       SVARB    5
     *     TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,       SVARB    6
     *     NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,       SVARB    7
     *     NT    , NT1   , NT2   , NT3   , PHIFO , NCONE , RADI  ,       SVARB    8
     *     PHIF  , METHOD, LAS   , NBC   , PINF  , RHOIN , UINF  ,       SVARB    9
     *     QINF,DIAM,ALENGT,ZDELF,ZOG,ZSHIFT,IFAXIM                       SVARB   10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                       SVARB   11
      COMMON /LIMDO/NTEST(11),NCRTA,NOSXY(4),NCRTB(3),NSWCH(32),IN(32)      L1800    2
      COMMON/XYZ/NXYZ(3),X1(160),X2(160),X3(160),Y1(160),Y2(160),Y3(160     XYZ      2
     *),Z1(160),Z2(160),Z3(160)                                             XYZ      3
      COMMON/CONFG/WPHO,WRAO,WRTO,WRCON,GASCON,WPHO,WHSO,WRAO,WPRTO,WRGX     CONFG    2
      COMMON/REALG/NREAL,NWPRT,BODYH,BODYS,PSONIC,RSONIC,P11NF,R11NF        REALG    2
     *,V11NF,NITPVG,NLROUT                                                  REALG    3
      COMMON/ENTRO/S(41),ZBS,ZFLD,ITPRTB,ITPRTF,NCASE,NTDSDS                ENTRO    2
      DIMENSION PK13(41),PK14(41),PK21(41),PK22(41),PK23(41)                BNDRY   12
      LOGICAL ITAND                                                         BNDRY   13
      ARSIN(A)=ASIN(A)                                                      BNDRY   14
      GO TO (10,18,11),K1                                                   BNDRY   15
   10 CONTINUE                                                              BNDRY   16
      IF(NCONE.EQ.2) GO TO 32                                               BNDRY   17
C...DETERMINE SURFACE ENTROPY FOR CONICAL BODIES                            BNDRY   18
      IF(W   4)) 16,16,15                                                   BNDRY   19
   15 DO 13 K=5,NPHM1                                                       BNDRY   20
      IF(W(3,K)) 17,17,13                                                   BNDRY   21
   13 CONTINUE                                                              BNDRY   22
      KENT=NPHI                                                             BNDRY   23
      GO TO 19                                                              BNDRY   24
   17 CONTINUE                                                              BNDRY   25
      KENT=K-1                                                              BNDRY   26
      GO TO 19                                                              BNDRY   27
   16 DO 7 K=5,NPHM1                                                        BNDRY   28
      IF(W(3,K)) 7,8,8                                                      BNDRY   29
    7 CONTINUE                                                              BNDRY   30
      KENT=NPHI                                                             BNDRY   31
      GO TO 20                                                              BNDRY   32
    8 CONTINUE                                                              BNDRY   33
      KENT=K-1                                                              BNDRY   34
      GO TO 20                                                              BNDRY   35
   19 CONTINUE                                                              BNDRY   36
      DO 24 K=3,NPHI                                                        BNDRY   37
      IF(K.LE.KENT) S(K)=P(4,3)/RHO(4,3)**GAMMA                             BNDRY   38
      IF(K.GT.KENT) S(K)=P(4,NPHI)/RHO(4,NPHI)**GAMMA                       BNDRY   39
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                  24 CONTINUE                                                    BNDRY   40
                     GO TO 32                                                    BNDRY   41
60                20 CONTINUE                                                    BNDRY   42
                     DO 31 K=3,NPHI                                              BNDRY   43
                  31 S(K)=P(4,KENT)/RHO(4,KENT)**GAMMA                           BNDRY   44
                  32 CONTINUE                                                    BNDRY   45
               C..WEAK OR SMALL ANGLE CORRECTIONS (USES PRANDTL-MEYER RELATIONS) BNDRY   46
65                   DO 9 K=3,NPHI                                              BNDRY   47
                     PK4=1.0/SQRT(RBZ(K)**2+1.0+(RBPH(K)/RB(K))**2)             BNDRY   48
                     PK1=-RBZ(K)*PK4                                            BNDRY   49
                     PK2=PK4                                                    BNDRY   50
                     PK3=-RBPH(K)/RB(K)*PK4                                     BNDRY   51
70                   IT2=0.FALSE.                                               BNDRY   52
                  25 CONTINUE                                                    BNDRY   53
                     QSQ=U(3,K)**2+V(3,K)**2+W(3,K)**2                          BNDRY   54
                     IF(P(3,K).GE.0.0) GO TO 4                                  BNDRY   55
               C..NEGATIVE SURFACE PRESSURE                                     BNDRY   56
75                   ICHECK=1                                                   BNDRY   57
                     WRITE(6,100)K,Z,P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K),ICHECK BNDRY   58
                     P(3,K)=ABS(P(3,K))                                         BNDRY   59
                     PPPP=0.5*(P(3,K+1)+P(3,K-1))                               BNDRY   60
                     IF(P(3,K) .GT. PPPP)P(3,K)=ABS(PPPP)                       BNDRY   61
80                   RHO(3,K)=(P(3,K)/S(K))**(1.0/GAMMA)                        BNDRY   62
                     Q3K=SQRT(1.0-P(3,K)/RHO(3,K))                              BNDRY   63
                     U(3,K)=U(3,K)*Q3K/QSQ**0.5                                 BNDRY   64
                     V(3,K)=V(3,K)*Q3K/QSQ**0.5                                 BNDRY   65
                     W(3,K)=W(3,K)*Q3K/QSQ**0.5                                 BNDRY   66
85                   WRITE(6,103) P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K)          BNDRY   67
                     QSQ=Q3K**2                                                 BNDRY   68
                  4  CONTINUE                                                    BNDRY   69
                     IF(RHO(3,K) .GE. 0.0)GO TO 5                               BNDRY   70
                     ICHECK=2                                                   BNDRY   71
90                   WRITE(6,100)K,Z,P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K),ICHECK BNDRY   72
                     RHO(3,K)=ABS(RHO(3,K))                                     BNDRY   73
                     RRRR=0.5*(RHO(3,K+1)+RHO(3,K-1))                           BNDRY   74
                     IF(RHO(3,K) .GT. RRRR)RHO(3,K)=ABS(RRRR)                   BNDRY   75
                     P(3,K)=S(K)*RHO(3,K)**GAMMA                                BNDRY   76
95                   Q3K=SQRT(1.0-P(3,K)/RHO(3,K))                              BNDRY   77
                     U(3,K)=U(3,K)*Q3K/QSQ**0.5                                 BNDRY   78
                     V(3,K)=V(3,K)*Q3K/QSQ**0.5                                 BNDRY   79
                     W(3,K)=W(3,K)*Q3K/QSQ**0.5                                 BNDRY   80
                     WRITE(6,103)P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K)           BNDRY   81
100               5  CONTINUE                                                    BNDRY   82
                     PK5=SQRT(QSQ)                                              BNDRY   83
                     PK6=(PK1*U(3,K)+PK2*V(3,K)+PK3*W(3,K))/PK5                 BNDRY   84
                     PK6D=PK6*RADI                                              BNDRY   85
                     PK7=ARSIN(PK6)                                             BNDRY   86
105                  PK7D=PK7*RADI                                              BNDRY   87
                     IF(PK7D .GT. 5.0)WRITE(6,102)K,PK7D                        BNDRY   88
                     IF (NPERL.EQ.-1) GO TO 28                                  BNDRY   89
                     PK8=GAM(1)*P(3,K)/RHO(3,K)                                 BNDRY   90
                     PK9=PK5**2/PK8                                             BNDRY   91
110                  PK10=PK9-1.0                                               BNDRY   92
                     IF(PK10 .GT. 0.0)GO TO 6                                   BNDRY   93
                     ICHECK=3                                                   BNDRY   94
                     WRITE(6,100)K,Z,P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K),ICHECK BNDRY   95
                     PK10=0.5                                                   BNDRY   96
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                PK9=1.5                                                          BNDRY      97
                PK8=PK5**2/PK9                                                   BNDRY      98
                RHO(3,K)=GAM(1)*P(3,K)/PK8                                       BNDRY      99
                G3K=SQRT(1.0-P(3,K)/RHO(3,K))                                    BNDRY     100
                U(3,K)=U(3,K)*G3K/G5Q**0.5                                       BNDRY     101
120             V(3,K)=V(3,K)*G3K/G5Q**0.5                                       BNDRY     102
                W(3,K)=W(3,K)*G3K/G5Q**0.5                                       BNDRY     103
                WRITE(6,103)P(3,K),RHO(3,K),U(3,K),V(3,K),W(3,K)                 BNDRY     104
              6 CONTINUE                                                         BNDRY     105
                PK11=GAM(1)*PK9/SQRT(PK10)                                       BNDRY     106
125             PK12=(GAM(1)*PK9*((GAM(1)+1.0)*PK9**2-4.0*PK10)/(4.0*PK10**2)    BNDRY     107
            C..NEXT TWO TERMS COMPUTE COEFFICIENTS FOR DENSITY EXPANSION         BNDRY     108
                IF(NSWCH(5).EQ.0) GO TO 2                                        BNDRY     109
                PK25=PK11/GAMMA                                                  BNDRY     110
                PK26=PK9*((3.0-GAMMA)*PK9*(PK9-2.0)+4.0)/(4.0*PK10**2)           BNDRY     111
130           2 CONTINUE                                                         BNDRY     112
                PK13(K)=P(3,K)*(1.0-PK11*PK7+PK12*PK7**2)                        BNDRY     113
                FACTOR=0.5*GAMMA*PK9/(PK10**3.5)                                 BNDRY     114
                TERM1=(GAMMA+1.0)*PK7**4/8.0                                     BNDRY     115
                TERM2=-(5.0+7.0*(GAMMA-2.0)/GAMMA**2)*PK9**3/6.0                 BNDRY     116
135             TERM3= 5.0*(GAMMA+1.0)*PK9**2/3.0                                BNDRY     117
                TERM4=4.0/3.0-2.0*PK9                                            BNDRY     118
                COEFF3=FACTOR*(TERM1+TERM2+TERM3+TERM4)                          BNDRY     119
                PTEST=PK13(K)-P(3,K)*COEFF3*PK7**5                               BNDRY     120
                IF(ABS(PK7) .LT. ABS(0.1))GO TO 123                              BNDRY     121
140             WRITE (6,122) PK7,P(3,K),PK13(K),PTEST,K                         BNDRY     122
                XM1 = SQRT(PK9)                                                  BNDRY     123
                CALL PRNTURN(XM1,PK7,P2P1,NITS,GAMMA)                            BNDRY     124
                PTRUE = P(3,K)*P2P1                                              BNDRY     125
                WRITE(6,124) PTRUE,NITS                                          BNDRY     126
145           124 FORMAT(1H*,E8X,F15.9,* NITS=*,I3)                              BNDRY     127
                PTEST = PTRUE                                                    BNDRY     128
              122 FORMAT (1X6HANGLE,F1.F2,P2TEST=*,4F15.9,I5)                    BNDRY     129
              123 CONTINUE                                                       BNDRY     130
                PK13(K)=(PTEST+P(3,K))*(0.5*(0.60+.200*P(3,K+1)+P(3,K-1)))       BNDRY     131
150             PK13(K)=(PTEST+P(3,K))*(0.5*(0.70+.150*P(3,K+1)+P(3,K-1)))       BNDRY     132
                PK13(K)=(PTEST+P(3,K))*(0.5*(0.99+.005*P(3,K+1)+P(3,K-1)))       BNDRY     133
                PK13(K)=PTEST                                                    LINE        1
                PK14(K)=(PK13(K)/S(K))**(1.0/GAMMA)                              BNDRY     134
                IF(NSWCH(5).EQ.0) GO TO 3                                        BNDRY     135
155             PK14(K)=RHO(3,K)*(1.0-PK25*PK7+PK26*PK7**2)                      BNDRY     136
                S(K)=P(3,K)/RHO(3,K)**GAMMA                                      BNDRY     137
              3 CONTINUE                                                         BNDRY     138
                PK15=SQRT(1.0-PK13(K)/PK14(K))                                   BNDRY     139
                GO TO 23                                                         BNDRY     140
160           22 CONTINUE                                                        BNDRY     141
                IF (NWRPRT.EQ.2) WRITE (6,101) PK7,BOOYH,BOOYS                   BNDRY     142
                IF (NSWCH(2).GT.0) GO TO 26                                      BNDRY     143
            C    FOLLOWING STATEMENTS TO 23 ARE FOR RELAXING CONSTANT ENTROPY.   BNDRY     144
                CALL PRANG(PK7,P(3,K),PK13(K),PK14(K),PK15)                      BNDRY     145
165             GO TO 23                                                         BNDRY     146
              26 CONTINUE                                                        BNDRY     147
                CALL PGAS(P(3,K),RHO(3,K),GRAX,GRAY,GRTX,GRSX,GASCON,GRGY,-1,1,2) BNDRY     148
                GAMACH=(PK5/GRAX)**2                                             BNDRY     149
                BETA=SQRT(GAMACH-1.)                                             BNDRY     150
170             DELP=PK7*RHO(3,K)*U3/GAMBETA                                     BNDRY     151
                PK13(K)=P(3,K)-DELP                                              BNDRY     152
```

```
                CALL RGRS(PK13(K),PK14(K),WMAX,WMAY,WMIN,S(K),GAMCON,WP1M, 1.5,2)  BNDRY  153
                PK15=SQRT(2.0*(BCOTH-WMAX))                                       BNDRY  154
             23 CONTINUE                                                          BNDRY  155
175             PK16=PK6*PK5*PK4                                                  BNDRY  156
                PK17=U(3,K)+PK16*RHOZ(K)                                          BNDRY  157
                PK18=V(3,K)-PK16                                                  BNDRY  158
                PK19=W(3,K)+PK16*PHIPH(K)/RB(K)                                   BNDRY  159
                PK20=SQRT(PK17**2+PK18**2+PK19**2)                                BNDRY  160
180             PK24=PK15/PK20                                                    BNDRY  161
                PK21(K)=PK24*PK17                                                 BNDRY  162
                PK22(K)=PK24*PK18                                                 BNDRY  163
                PK23(K)=PK24*PK19                                                 BNDRY  164
                IF (NSWCH(2).LE.0) GO TO 9                                        BNDRY  165
185             IF (AREAL.EQ.-1) GO TO 9                                          BNDRY  166
                IF (IT.NE.0) GO TO 9                                              BNDRY  167
                IT2ND=.TRUE.                                                      BNDRY  168
                IF (ABS(P(3,K)-PK13(K)).LT.P(3,K)*1.0E-3) GO TO 9                 BNDRY  169
                P(3,K)=PK13(K)                                                    BNDRY  170
190             RHO(3,K)=PK14(K)                                                  BNDRY  171
                U(3,K)=PK21(K)                                                    BNDRY  172
                V(3,K)=PK22(K)                                                    BNDRY  173
                W(3,K)=PK23(K)                                                    BNDRY  174
                GO TO 25                                                          BNDRY  175
195          9  CONTINUE                                                         BNDRY  176
             11 CONTINUE                                                          BNDRY  177
             C..RESET BODY VARIABLES TO THOSE CALCULATED BY ABBETTS SCHEME        BNDRY  178
                DO 12 K=3,NPHI                                                    BNDRY  179
                P(3,K)=PK13(K)                                                    BNDRY  180
200             RHO(3,K)=PK14(K)                                                  BNDRY  181
                U(3,K)=PK21(K)                                                    BNDRY  182
                V(3,K)=PK22(K)                                                    BNDRY  183
                W(3,K)=PK23(K)                                                    BNDRY  184
             12 CONTINUE                                                          BNDRY  185
205             GO TO 21                                                          BNDRY  186
             18 CONTINUE                                                          BNDRY  187
             C                                                                    BNDRY  188
             C..APPLY REFLECTION PRINCIPLE AT PLANES OF SYMMETRY                  BNDRY  189
             C                                                                    BNDRY  190
210             DO 1 K=1,2                                                        BNDRY  191
                M=6-K                                                             BNDRY  192
                L=NPHI+K                                                          BNDRY  193
                N=2*PHI-K                                                         BNDRY  194
                DO 1 J=3,NT2                                                      BNDRY  195
215             RHO(J,K)=RHO(J,M)                                                 BNDRY  196
                RHO(J,L)=RHO(J,N)                                                 BNDRY  197
                P(J,K)=P(J,M)                                                     BNDRY  198
                P(J,L)=P(J,N)                                                     BNDRY  199
                U(J,K)=U(J,M)                                                     BNDRY  200
220             U(J,L)=U(J,N)                                                     BNDRY  201
                V(J,K)=V(J,M)                                                     BNDRY  202
                V(J,L)=V(J,N)                                                     BNDRY  203
                W(J,K)=-W(J,M)                                                    BNDRY  204
                W(J,L)=-W(J,N)                                                    BNDRY  205
225             W(J,3)=0.0                                                        BNDRY  206
                W(J,NPHI)=0.0                                                     BNDRY  207
             1  CONTINUE                                                          BNDRY  208
                IF(ICONST(5).LT.100.OR.NCONE.EQ.2) GO TO 21                       BNDRY  209
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      C..SET ENTROPY CONSTANT IN WINDWARD PLANE FOR CONICAL FLOWS                BNDRY  210
230         IF(ALPH) 27,28,28                                                    BNDRY  211
         27 SSH=P(NT2,NPHI)/RHO(NT2,NPHI)**GAMMA                                 BNDRY  212
            DO 29 J=4,NT1                                                        BNDRY  213
            RHO(J,NPHI)=(P(J,NPHI)/SSH)**(1.0/GAMMA)                             BNDRY  214
            GN2=1.0-P(J,NPHI)/RHO(J,NPHI)                                        BNDRY  215
235         VOU=V(J,NPHI)/U(J,NPHI)                                              BNDRY  216
            U(J,NPHI)=SQRT(GN2/(1.0+VOU**2))                                     BNDRY  217
            V(J,NPHI)=U(J,NPHI)*VOU                                              BNDRY  218
         29 CONTINUE                                                             BNDRY  219
            GO TO 21                                                             BNDRY  220
240      28 SSH=P(NT2,3)/RHO(NT2,3)**GAMMA                                       BNDRY  221
            DO 30 J=4,NT1                                                        BNDRY  222
            RHO(J,3)=(P(J,3)/SSH)**(1.0/GAMMA)                                   BNDRY  223
            GN2=1.0-P(J,3)/RHO(J,3)                                              BNDRY  224
            VOU=V(J,3)/U(J,3)                                                    BNDRY  225
245         U(J,3)=SQRT(GN2/(1.0+VOU**2))                                        BNDRY  226
            V(J,3)=U(J,3)*VOU                                                    BNDRY  227
         30 CONTINUE                                                             BNDRY  228
         21 CONTINUE                                                             BNDRY  229
        100 FORMAT(1HO,38HERROR CHECK-NEGATIVE PRESSURE IN BNDRY /1H ,           BNDRY  230
250     *2HR=,I3,3X,2HZ=,F10.3/1H ,2HP=,E13.6,3X,4HPHO=,E13.6,3X,2HU=,E13.6      BNDRY  231
        *,3X,                                                                    BNDRY  232
        *2HV=,E13.6,3X,2HW=,E13.6,3X,7HICHECK=,I2)                               BNDRY  233
        101 FORMAT(1H ,18H*BNDRY - RHO(PKT)= ,1PE12.5,1X,3HMB=,1PE12.5,1X,       BNDRY  234
        *3HMB=,1PE12.5)                                                          BNDRY  235
255     102 FORMAT(1HO,31HDEFLECTION ANGLE IN BNDRY AT K=,I3,1X,                 BNDRY  236
        *2HI5,F7.3)                                                              BNDRY  237
        103 FORMAT(1H ,23HMODIFICATION INSTITUTED /1H ,2HP=,E13.6,3X,            BNDRY  238
        *4HRHO=,E13.6,3X,                                                        BNDRY  239
        *2HU=,E13.6,3X,2HV=,E13.6,3X,2HW=,E13.6)                                 BNDRY  240
260         RETURN                                                               BNDRY  241
            END                                                                  BNDRY  242
```

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SUBROUTINE PHYTURN    76/76   OPT=1                    FTN 4.6+460      08/15/79 18.58.36      PAGE     1

1                SUBROUTINE PHYTURN(M1,DNU,P2P1,NITS,GM)                                    PHYTURN     2
              C  A THOMAS R. SHORES PRODUCTION.                                             PHYTURN     3
                 REAL M1,M2,M                                                               PHYTURN     4
                       XNU(M) = ATAN(SQRT((C*(MMM-1.)))/SQRTC-ATAN(SQRT(MMM-1.))            PHYTURN     5
5                      XNUP(M) = SQRT(MMM-1.)/(1.+(GM-1.)/2.*MMM)/M                         PHYTURN     6
                 C = (GM-1.)/(GM+1.)                                                        PHYTURN     7
                 SQRTC = SQRT(C)                                                            PHYTURN     8
                 EPS = 0.1E-6                                                               PHYTURN     9
                 XNU1 = XNU(M1)                                                             PHYTURN    10
10               XNU2 = XNU1+DNU                                                            PHYTURN    11
                 XM = M1                                                                    PHYTURN    12
                 DO 10 I=1,20                                                               PHYTURN    13
                 NITS = I                                                                   PHYTURN    14
                 M2 = XM - (XNU(XM)-XNU2)/XNUP(XM)                                          PHYTURN    15
15               IF (M2 .GT. 100.0) GO TO 20                                                PHYTURN    16
                 IF (ABS((M2-XM)/XM) .LT. EPS) GO TO 30                                     PHYTURN    17
              10 XM = M2                                                                    PHYTURN    18
              20 CONTINUE                                                                   PHYTURN    19
                 M2 = 100.0                                                                 PHYTURN    20
20               WRITE(6,1)                                                                 PHYTURN    21
               1 FORMAT(1H ,15X,8- - - - BODY TURN STOPPED AT M2 = 100.0 - - - -8)           PHYTURN    22
              30 CONTINUE                                                                   PHYTURN    23
                 P2P1 = ((1.+(GM-1.)/2.*M1*M1)/(1.+(GM-1.)/2.*M2*M2))**(GM/(GM-1.))         PHYTURN    24
                 RETURN                                                                     PHYTURN    25
25               END                                                                        PHYTURN    26
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                                                                                PHYTURN    27
                                                                                PHYTURN    28
      SUBROUTINE BODENT(S)                                                      BODENT      2
      LEVEL 2,ETEMP,EO,FO,GO,HO                                                 CVARB       2
      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                                  CVARB       3
     *      FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                         CVARB       4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4        PVARB       2
     *1) ,                                                                      PVARB       3
     *      RHI(41)    , RHOZ(41) , VINF(41) , WINF(41) ,                      PVARB       4
     *      RHOPH(41)  ,              PB(41)   , PHZ(41)  , RBPH(41) ,         PVARB       5
     *     DTDPH(24,41), BET(41)  ,DTDZ(24,41),DTDM(41) , ACT(41)  ,          PVARB       6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NPRGON    , RS(41)   ,          PVARB       7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)          PVARB       8
      COMMON /ID,RB,PE,EIA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)          IDVARB      2
      COMMON/SVARB/T,Z      , PHI    , DT     , DZ     , DPHI   , ZINT   ,     SVARB       2
     *      ZERO   , PI     , ALPHA , GAMMA , SIGMA , XMACH , TAVE1 ,         SVARB       3
     *      TAVE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPOINT , DZDT  ,          SVARB       4
     *      DZDPH , ZM    , TMAD  , TMLD  , TMM   , TML   , TTMU  ,          SVARB       5
     *      TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,          SVARB       6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,          SVARB       7
     *      NT    , NT1   , NT2   , NT3   , PHIPD , NCORE , PHI1  ,          SVARB       8
     *      PHIF  , METHOD, LAG   , NEC   , PINF  , RNOIN , UINF  ,          SVARB       9
     *      GINF,DIAM,RLENGT,ZREF,ZCG,ZSHIFT,IFRADM                           SVARB      10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                           SVARB      11
      COMMON /L1600/NTEST(11),NCRIT,NOSKY(4),NCRTB(3),NSWCH(32),IN(32)          L1600       2
      COMMON/XYZ/NXYZ(3),X1(160),X2(160),X3(160),Y1(160),Y2(160),Y3(160         XYZ         2
     *),Z1(160),Z2(160),Z3(160)                                                 XYZ         3
      COMMON/CONFG/WRHO,WRHO,WRTO,WRCON,GASCON,WRHO,WPSC,WRAO,WPRTO,WRGX         CONFG       2
      COMMON/RENG/NMACH,NWRPT,BODYH,BODYS,PSONIC,RSONIC,PINF,RINF               RENG        2
     *,VINF,NITAVG,NWRAT                                                        RENG        3
      DIMENSION S(41),ST(41)                                                    BODENT     11
      I=NSWCH(2)                                                                BODENT     12
      DO 1 K=3,NPHI                                                             BODENT     13
      IF(NPHAL.EQ.-1) GO TO 10                                                  BODENT     14
      SHK=P(4,K)/RHO(4,K)**GAMMA                                                BODENT     15
      GO TO 11                                                                  BODENT     16
   10 CONTINUE                                                                  BODENT     17
      CALL AGAS(P(4,K),RHO(4,K),WRAX,WRHX,WRTX,SHK,GASCON,WRGX,-1,4,2)          BODENT     18
   11 CONTINUE                                                                  BODENT     19
      GO TO(7,7,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8),1                     BODENT     20
    7 CONTINUE                                                                  BODENT     21
      R=TP(4)*(ROB(K)-RB(K))+RB(K)                                              BODENT     22
      AHK=DTDZ(4,K)+(V(4,K)*DTDP(K)  +W(4,K)*DTDPH(4,K)/R)/U(4,K)               BODENT     23
      R=TP(3)*(ROB(K)-RB(K))+RB(K)                                              BODENT     24
      RKP1=TP(3)*(ROB(K+1)-RB(K+1))+RB(K+1)                                     BODENT     25
      RKM1=TP(3)*(ROB(K-1)-RB(K-1))+RB(K-1)                                     BODENT     26
      BK=W(3,K)*DTIL(K)/(U(3,K)*R)                                              BODENT      2
      BKP1=W(3,K+1)*DTIL(K+1)/(U(3,K+1)*RKP1)                                   BODENT     28
      BKM1=W(3,K-1)*DTIL(K-1)/(U(3,K-1)*RKM1)                                   BODENT     29
      ST(K)=S(K)-DZDT*AHK*0.5*(SHK-S(K))-DZDPH*0.25*(BKP1+BKM1)                 BODENT     30
     * *(S(K+1)-S(K-1))+0.5*DZDPH**2*((BKP1+BK)*0.5*(S(K+1)-S(K))              BODENT     31
     * -(BK+BKM1)*0.5*(S(K)-S(K-1)))                                            BODENT     32
      GO TO 1                                                                   BODENT     33
    8 CONTINUE                                                                  BODENT     34
      FACTS=1.0-.01*XXXX                                                        BODENT     35
      DELS=(S(K)-SHK)*FACTS                                                     BODENT     36
      ST(K)=S(K)-DELS                                                           BODENT     37
```

```
      1     CONTINUE                                                          BOGENT   38
            ST(2)=ST(4)                                                       BOGENT   39
60          ST(NPHI1)=ST(NPHM1)                                               BOGENT   40
            GO TO(3,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4),I                  BOGENT   41
      3     DO 5 K=2,NPHI1                                                    BOGENT   42
      5     S(K)=ST(K)                                                        BOGENT   43
            GO TO 6                                                           BOGENT   44
65    4     CONTINUE                                                          BOGENT   45
            DO 2 K=3,NPHI                                                     BOGENT   46
      2     S(K)=0.25*(ST(K+1)+2.0*ST(K)+ST(K-1))                             BOGENT   47
            S(2)=S(4)                                                         BOGENT   48
            S(NPHI1)=S(NPHM1)                                                 BOGENT   49
70    6     CONTINUE                                                          BOGENT   50
      100   FORMAT(1H ,21HSURFACE ENTROPY AT Z=,F10.5,15H WAS REDUCED BY,F10.5 BOGENT   51
     *)                                                                       BOGENT   52
            PLTLPN                                                            BOGENT   53
            END                                                               BOGENT   54
```

```
   FUNCTION COSH       76/76   OPT=1                FTN 4.6+460      06/15/79  18.58.36      PAGE     1

1                FUNCTION COSH(A)                                      COSH      2
                 COSH=.5*(EXP(A)+EXP(-A))                              COSH      3
                 RETURN                                                COSH      4
                 END                                                   COSH      5
```

```
   FUNCTION SINH       76/76   OPT=1                FTN 4.8+460      06/15/79  18.58.36      PAGE     1

1                  FUNCTION SINH(A)                                    SINH       2
                   SINH=.5*(EXP(A)-EXP(-A))                            SINH       3
                   RETURN                                              SINH       4
                   END                                                 SINH       5
```

```
          BLOCK DATA                                                         DATA1       2
          LEVEL 2,ETEMP,ED,FD,GD,HD                                          CVARB       2
          COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                           CVARB       3
     *       FD(4,24,41)     , GD(4,24,41) , HD(4,24,41)                     CVARB       4
          COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB       2
     *1) ,                                                                   PVARB       3
     *       PDB(41)     , RGBZ(41) , VINF(41) , WINF(41) ,                  PVARB       4
     *       RGBPH(41)   ,          RB(41)    , RBZ(41)   , RBPH(41) ,       PVARB       5
     *      DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDPH(41) , ACT(41)   ,      PVARB       6
     *       ICONST(50) , GAM(20)  , CONST(50) ,AMEC/N    , RS(41)    ,      PVARB       7
     *       RSZ(41)    , RSPH1(41), PST(41)   , RSZT(41), RSPHIT(41)        PVARB       8
          COMMON /IDVARB/MX,ETA(41),PHIP(41),DTIL(41),DTILF(41),BETA,TP(24)  IDVARB      2
          COMMON/SVARB/T,Z      , PHI   , DT    , DZ    , EPHI  , ZINT  ,    SVARB       2
     *       ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,         SVARB       3
     *       TAPE2 , DISK1 , ALFH  , DISK2 , SIGM  , NPRNT , DZDT  ,         SVARB       4
     *       DZCPH , ZM    , TMSD  , TMLD  , TMW   , TML   , TTMW  ,         SVARB       5
     *       TTML  , RZ    , BZ    , NDPHI , NIT   , EPHI  , NITER ,         SVARB       6
     *       NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,         SVARB       7
     *       NT    , NT1   , NT2   , NT3   , PHIPD , NCASE , RADI  ,         SVARB       8
     *       PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,         SVARB       9
     *       GINF,CINF,ALENGT,ZREF,ZOG,ZSHIFT,IFANGM                         SVARB      10
          INTEGER DISK1,DISK2,TAPE1,TAPE2                                    SVARB      11
          COMMON /LIBCD/NTEST(11),NCRTA,NOSKY(4),NCRTB(3),NSWCH(32),IN(32)   LIBCD       2
          COMMON/XYZ/NXYXY(3),X1(160),X2(160),X3(160),Y1(160),Y2(160),Y3(160 XYZ         2
     *),Z4(160),Z2(160),Z3(160)                                              XYZ         3
          COMMON/JCE/ZL1,CF1,CF2,ZLF,ZTRAN,DZTRAN                            JCE         2
          COMMON/EPSL/EPSL1,EPSL2                                            EPSL        2
          COMMON/REALS/PREAL,NWPRT,BODYH,BODYS,PSONIC,RSONIC,PIINF,RIINF     REALS       2
     *,VIINF,NITAVG,NWROUT                                                   REALS       3
          COMMON/CONFIG/WPPD,WPHJ,WRTD,WPICN,GASCON,WPHJ,WRSD,WRRC,WARTD,WPSK CONFG      2
          COMMON/ENTROP/SEN(41),ZBS,ZFED,ITPRTB,ITPRIF,NCRSE,NTDUCS          ENTRO       2
          COMMON/CFS/NCFS                                                    CFS         2
          COMMON/CLUSTR/RJ,XI(24),TAI(24),TPIT(24)                           CLUSTR      2
          COMMON /ACCNT/ACCA(51)                                             ACCNT       2
          COMMON/WACKD1/K,J,NPHIWR,NT2WR,WRMACH,FXXFUN,WRZ                   WACKD1      2
C         ICONST(4)=1  PRINTS GEOM DATA WHEN GEOMS IS CALLED.                DATA1      18
C..       NSWCH(5)  NE.0 BOUNDARY DENSITY CONDITION DETERMINED FROM WEAK -   DATA1      19
C          SHOCK EXPANSION.                                                  DATA1      20
C..       NSWCH(5) .EQ.0 CONSTANT ENTROPY EXPRESSIONS USED.                  DATA1      21
C..       NSWCH(2) .EQ.0 DETERMINE BODY SURFACE ENTROPY DISTRIBUTION FOR     DATA1      22
C           PURPOSE OF RELAXING ENTROPY PROFILE  (CALLS BULENT).             DATA1      23
C..       NSWCH(2) .EQ.0 CONSTANT ENTROPY.                                   DATA1      24
          DATA ICONST/0,2,0,1,46*0/                                          DATA1      25
          DATA NBC,METHOD/1,2/                                               DATA1      26
          DATA NPRNT/0/                                                      DATA1      27
          DATA NWPRT,NWROUT/0,0/                                             DATA1      28
          DATA IN/32*0/                                                      DATA1      29
          DATA NTEST,NCRTA,NOSKY,NCRTB/11*0,0,4*0,3*0/                       DATA1      30
          DATA NXYXY,X1,X2,X3,Y1,Y2,Y3,Z4,Z2,Z3/3*0,160*0.,160*0.,           DATA1      31
     *160*0.,160*0.,160*0.,160*0.,160*0.,160*0.,160*0./                      DATA1      32
          DATA NSWCH/32*0/                                                   DATA1      33
          DATA DZDT/0./                                                      DATA1      34
          DATA ACCA/51*0/                                                    DATA1      35
          DATA WRMACH/0./                                                    DATA1      36
          END                                                                DATA1      37
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BLOCK DATA BLKDAT.    76/76   OPT=1                    FTN 4.6+460      06/15/79  18.58.36      PAGE     1

      1               BLOCK DATA                                                                  DATA2      2
                      LEVEL 2,ETEMP,ED,FD,GD,HD                                                   CVARB      2
                      COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                                    CVARB      3
                     *       FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                          CVARB      4
      5               COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4          PVARB      2
                     *1) ,                                                                        PVARB      3
                     *       RDB(41)    , RDBZ(41) , VINF(41) , WINF(41) ,                       PVARB      4
                     *       RDDPH(41)  ,            PB(41)    , PBZ(41)  , PBPH(41) ,          PVARB      5
                     *      DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,          PVARB      6
     10               *       ICONST(50) , GAM(20)  , CONST(50) ,NPRGEN   , RS(41)   ,          PVARB      7
                     *       RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)          PVARB      8
                      COMMON /IDVARB/RX,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)          IDVARB     2
                      COMMON/SVARB/T,Z      , PHI    , DT     , DZ     , DPHI   , ZINT   ,      SVARB      2
                     *       ZERO   , PI     , ALPHA  , GAMMA  , SIGMA  , MARCH  , TAPE1  ,      SVARB      3
     15               *       TAPE2  , DISK1  , ALPH   , DISK2  , SIGM   , NPRNT  , DZDT   ,      SVARB      4
                     *       DZLPH  , ZM     , THED   , THED   , THW    , THL    , TTHW   ,      SVARB      5
                     *       TTHL   , RZ     , BZ     , NPHI1  , NIT    , KPHI   , WITER  ,      SVARB      6
                     *       NPHI   , NPHI1  , NPHI2  , NPHI3  , NPHM1  , NPHM2  , NPHM3  ,      SVARB      7
                     *       NT     , NT1    , NT2    , NT3    , PHIFD  , NCONE  , MADI   ,      SVARB      8
     20               *       PHIF   , METHOD, LAG    , NBC    , PINF   , RHOIN  , UINF   ,      SVARB      9
                     *       QINF,DIFM,RLENGT,ZPEF,ZCG,ZSHIFT,IFFROM                            SVARB     10
                      INTEGER DISK1,DISK2,TAPE1,TAPE2                                           SVARB     11
                      COMMON /L1800/MTEST(11),NCRTA,NCSRY(4),NCRTB(3),NSWCH(32),INC(32)         L1800      2
                      COMMON/XYZ/XXXX(3),Y1(160),Y2(160),Y3(160),Y4(160),Y5(160),Y6(160         XYZ        2
                     *),ZH(160),ZC(160),ZS(160)                                                 XYZ        3
                      COMMON/JKL/ZL1,GR1,GR2,ZLF,ZIRAN,DZTRAN                                   JKL        2
                      COMMON/EPSL/EPSL1,EPSL2                                                   EPSL       2
                      COMMON/PERLG/MAXPT,NUMPAT,BODYH,BODYS,PSONIC,RSONIC,PINF,RHIN             PERLG      2
                     *,VIINF,NITAVG,NUROUT                                                      PERLG      3
     30               COMMON/CONPG/WRFD,WRNO,WRTO,WRCON,GASCON,WRHO,WRSO,WRAC,WRRTO,WRGA         CONPG      2
                      COMMON/ENTRO/S(41),ZBS,ZFLD,ITPRTB,ITPRTF,NCASE,NTOSOS                    ENTRO      2
                      COMMON/CFS/NCFS                                                           CFS        2
                      COMMON/CLUSTR/RJ,XI(24),TXI(24),TXIT(24)                                  CLUSTR     2
                      END                                                                       DATA2     16
```

```
      BLOCK DATA                                                        DATA3    2
      LEVEL 2,ETEMP,ED,FD,GD,HD                                         CVARB    2
      COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                          CVARB    3
     *      FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                 CVARB    4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB    2
     *1) ,                                                              PVARB    3
     *      ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,              PVARB    4
     *      RDBPH(41) ,              RB(41)    , RBZ(41)  , RBPH(41) , PVARB    5
     *     DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTER(41) , ACT(41)  ,  PVARB    6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NREGON   , RS(41)   ,  PVARB    7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)  PVARB    8
      COMMON /IDVARB/PX,ETA(41),PHIP(41),DTIL(41),DTILE(41),LETA,TP(24) IDVARB    2
      COMMON/SVARB/T,Z     , PHI    , DT    , DZ    , DPHI   , ZINT  ,  SVARB    2
     *      ZERO  , PI    , ALPHA , GAMMA , SIGMA , RMACH , TAPE1 ,  SVARB    3
     *      TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRINT , DZDT  ,  SVARB    4
     *      DZDPH , ZM    , TMAD  , TMID  , TMW   , TML   , TTMW  ,  SVARB    5
     *      TTML  , RZ    , BZ    , NIPHI , NIT   , EPHI  , NITEP ,  SVARB    6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,  SVARB    7
     *      NT    , NT1   , NT2   , NT3   , PHIPD , NCONE , RADI  ,  SVARB    8
     *      PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,  SVARB    9
     *      DINF,DIAM,RLENGT,ZREF,ZLG,ZSHIFT,IFANDM                   SVARB   10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                   SVARB   11
      COMMON /LIBCOM/NTL(11),NCNTA,NUSRX(9),NCRTB(3),NSWCH(12),INC(32)  LIBCO    2
      COMMON/XYZ/NXYZ(3),X1(160),X2(160),X3(160),Y1(160),Y2(160),Y3(160 XYZ      2
     *),Z1(160),Z2(160),Z3(160)                                         XYZ      3
      COMMON/JOE/ZL1,CF1,CF2,ZLF,ZTRAN1,DZTRAN                          JOE      2
      COMMON/EPSL/EPSL1,EPSL2                                           EPSL     2
      COMMON/REALG/NREAL,NUMPRT,BODYH,BODYS,PSONIC,RSONIC,PIINF,RIINF   REALG    2
     *,VIINF,NITAVG,NAMOUT                                              REALG    3
      COMMON/CONV/CVRFD,WPRD,WRTD,WRCEN,GASCON,WRHD,WRSD,WRAC,WRRTD,WRGX CONVG    2
      COMMON/ENTRO/S(41),ZBS,ZFLD,ITPRIB,ITPRIF,NCASE,NTDSDS            ENTRO    2
      COMMON/CFS/NCFS                                                   CFS      2
      COMMON/CLUSTR/RJ,XI(24),TXI(24),TXIT(24)                          CLUSTR   2
      DATA RHO,P,U,V,W/984*0.,984*0.,984*0.,984*0.,984*0./              DATA3   16
      DATA ROB,ROBZ,VINF,WINF,RDBPH,RB,RBZ,RBPH,BCT,DTDR,ACT,RS,        DATA3   17
     *RSZ,RSPHI,RST,RSZT,RSPHIT,ETA,PHIP,DTIL,DTILE/41*0.,41*0.,        DATA3   18
     *41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,     DATA3   19
     *41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,41*0.,     DATA3   20
     *41*0./                                                            DATA3   21
      DATA GAM/20*0./                                                   DATA3   22
      DATA CONST/50*0./                                                 DATA3   23
      DATA TP/24*0./                                                    DATA3   24
      DATA DTDPH,DTDZ/984*0.,984*0./                                    DATA3   25
      END                                                               DATA3   26
```

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SUBROUTINE DERIV      76/76   OPT=1                    FTN 4.6+460      06/15/79  18.58.36      PAGE     1

 1                    SUBROUTINE DERIV                                   DERIV      2
                C     SUBROUTINE TO COMPUTE DERIVATIVES                  DERIV      3
                      COMMON T(27)                                       BLANK      2
                      COMMON/COM1/MER,GAMMA                              COM2       2
 5                    COMMON /ERINT/IER                                  ERINT      2
                      COTAN(A)=COS(A)/SIN(A)                             DERIV      7
                      IER=0                                              DERIV      8
                      THET=T(2)                                          DERIV      9
                      A2=0.5*(GAMMA-1.0)*(1.0-T(4)**2-T(5)**2)           DERIV     10
10                    QUAN=T(4)**2-A2                                    DERIV     11
                      IF(ABS(QUAN)-0.0000000) 1,1,2                      DERIV     12
                1     IER=2                                              DERIV     13
                      MER=1                                              DERIV     14
                      RETURN                                             DERIV     15
15              2     T(6)=(A2*(T(5)+T(4)*COTAN(THET)))/(T(4)**2-A2)-T(5)  DERIV   16
                      T(7)=T(4)                                          DERIV     17
                      RETURN                                             DERIV     18
                      END                                                DERIV     19
```

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      SUBROUTINE DIFFR                                                  DIFFR      2
      LEVEL 2,ETEMP,EO,FO,GO,HO                                         CVARB      2
      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                          CVARB      3
     *      FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                 CVARB      4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB      2
     *1) ,                                                              PVARB      3
     *      ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,              PVARB      4
     *      ROBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,   PVARB      5
     *     DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTLR(41) , ACT(41)  ,   PVARB      6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NRELGON   , RS(41)   ,   PVARB      7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)   PVARB      8
      COMMON /IDVARB/RE,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24) IDVARB      2
      COMMON/SVARB/T,Z     , PHI   , DT    , DZ    , DPHI  , ZINT  ,    SVARB      2
     *      ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,    SVARB      3
     *      TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,    SVARB      4
     *      DZDPH , ZM    , TMAD  , TMLD  , TMW   , TML   , TTMW  ,    SVARB      5
     *      TTML  , PZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,    SVARB      6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,    SVARB      7
     *      NT    , NT1   , NT2   , NT3   , PHIFD , NCONE , RADI  ,    SVARB      8
     *      PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,    SVARB      9
     *      QINF ,DIAM,ALENGT,ZREF ,ZOG,ZSHIFT,IFARUN                   SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                   SVARB     11
      COMMON /LIBOO/NTEST(11),NDATA,NOSXY(4),NCPTB(3),NSWCH(32),IN(32)  LIBOO      2
      COMMON/CONFG/WFPO,WRRO,WRTO,WRCON,CASCON,WRHO,WRSO,WPAD,WRRTO,WRGX CONFG      2
      COMMON/REALG/NREAL,NWRPRT,BODYH,BODYS,PSONIC,RSONIC,PIINF,RIINF   REALG      2
     *,VIINF,NITAVG,NWROUT                                              REALG      3
      COMMON/ENTRO/S(41),ZBS,ZFLD,ITPRTB,ITPRTF,NCASE,NTDSOS            ENTRO      2
C..FORM CONSERVATIVE VARIABLES AT ALL POINTS                            DIFFR     11
      CALL IOCON(0)                                                     DIFFR     12
      DO 1 K=3,NPHI                                                     DIFFR     13
      DO 1 J=3,NT2                                                      DIFFR     14
      DO 1 N=1,4                                                        DIFFR     15
      IF(J.EQ.NT2) GO TO 2                                              DIFFR     16
C..PREDICTOR STEP AT BODY AND IN FIELD                                  DIFFR     17
      ETEMP(N,J,K)=EO(N,J,K)-(DZDT*(FO(N,J+1,K)-FO(N,J,K))              DIFFR     18
     *                       +DZDPH*(GO(N,J,K+1)-GO(N,J,K))+DZ*HO(N,J,K)) DIFFR     19
      GO TO 1                                                           DIFFR     20
2     CONTINUE                                                          DIFFR     21
C. PREDICTOR STEP AT SHOCK                                              DIFFR     22
      ETEMP(N,J,K)=EO(N,J,K)-(DZDT*(FO(N,J,K)-FO(N,J-1,K))              DIFFR     23
     *                       +DZDPH*(GO(N,J,K+1)-GO(N,J,K))+DZ*HO(N,J,K)) DIFFR     24
      GO TO 1                                                           DIFFR     25
1     CONTINUE                                                          DIFFR     26
      Z=Z+DZ                                                            DIFFR     27
C..DECODE CONSERVATIVE VARIABLES                                        DIFFR     28
      CALL IOCON(2)                                                     DIFFR     29
C..CALCULATE PREDICTED SHOCK VALUES                                     DIFFR     30
      CALL SHOCK(1)                                                     DIFFR     31
C..CALCULATES GEOMETRIC FACTORS BASED ON NEW BODY AND SHOCK GEOMETRY     DIFFR     32
      CALL GEOM1(1)                                                     DIFFR     33
C..APPLIES PLANE OF SYMMETRY BOUNDARY CONDITIONS                        DIFFR     34
      CALL BNDRY(2)                                                     DIFFR     35
C..FORM INTERMEDIATE CONSERVATIVE VARIABLES AT ALL POINTS               DIFFR     36
      CALL IOCON(1)                                                     DIFFR     37
      DO 3 KPHI=3,NPHI                                                  DIFFR     38
      DO 3 J=3,NT2                                                      DIFFR     39
      DO 3 N=1,4                                                        DIFFR     40
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                K=KPHI                                                          DIFFR     41
              C..DISSIPATION FUNCTION                                           DIFFR     42
   60         DISS=0.0                                                          DIFFR     43
              IF(CONST(4) .NE. 0.0 .OR. CONST(5) .NE. 0.0)CALL DISSIP(N,J,K,DIS DIFFR     44
             1S)                                                                DIFFR     45
              IF(J.EQ.3) GO TO 9                                                DIFFR     46
              IF(J.EQ.NT2) GO TO 5                                              DIFFR     47
   65         C..CORRECTOR IN FIELD                                             DIFFR     48
              ETEMP(N,J,K)=0.5*(EO(N,J,K)+ETEMP(N,J,K)-(DZDT*(FO(N,J,K)         DIFFR     49
             *-FO(N,J-1,K))+DZDPH*(GO(N,J,K)-GO(N,J,K-1))+DZ**HO(N,J,K))+DISS)  DIFFR     50
              GO TO 3                                                           DIFFR     51
   5          CONTINUE                                                          DIFFR     52
   70         C..CORRECTOR AT SHOCK                                             DIFFR     53
              ETEMP(N,J,K)=0.5*(ETEMP(N,J,K)+EO(N,J,K)-(DZDT*(FO(N,J,K)         DIFFR     54
             *-FO(N,J-1,K))+DZDPH*(GO(N,J,K)-GO(N,J,K-1))+DZ**HO(N,J,K))+DISS)  DIFFR     55
              GO TO 3                                                           DIFFR     56
   9          CONTINUE                                                          DIFFR     57
   75         C..CORRECTOR AT BODY                                              DIFFR     58
              ETEMP(N,J,K)=0.5*(ETEMP(N,J,K)+EO(N,J,K)-(DZDT*(FO(N,4,K)-FC(N,3,K DIFFR     59
             *)                                                                 DIFFR     60
             *)+DZDPH*(GO(N,3,K)-GO(N,3,K-1))+DZ**HO(N,3,K))+DISS)              DIFFR     61
   3          CONTINUE                                                          DIFFR     62
   80         C..DECODE CONSERVATIVE VARIABLES                                  DIFFR     63
              CALL IDCON(2)                                                     DIFFR     64
              C..CALCULATE CORRECTED SHOCK VALUES                               DIFFR     65
              CALL SHOCK(2)                                                     DIFFR     66
              C..CALCULATES GEOMETRIC FACTORS BASED ON OLD BODY AND NEW SHOCK GEOMETR DIFFR     67
   85         CALL GEOM1(2)                                                     DIFFR     68
              C..RESETS BODY VARIABLES                                          DIFFR     69
              CALL BNDRY(1)                                                     DIFFR     70
              C..APPLIES PLANE OF SYMMETRY BOUNDARY CONDITIONS                  DIFFR     71
              CALL BNDRY(2)                                                     DIFFR     72
   90         RETURN                                                            DIFFR     73
              END                                                               DIFFR     74
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      SUBROUTINE DISSIP(N,J,K,DISS)                                     DISSIP     2
     LEVEL 2,ETEMP,ED,FD,GD,HD                                          DISSIP     3
     COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                           DISSIP     4
    *       FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                 DISSIP     5
     COMMON/PVARB/RHO(24,41),P(24,41),U(24,41),V(24,41),W(24,41),       DISSIP     6
    *       RCB(41)    , ROBZ(41) , V1NF(41) , WINF(41) ,              DISSIP     7
    *       RCBPH(41)  ,            RH(41)   , PBZ(41)  , RBPH(41) ,   DISSIP     8
    *      DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,   DISSIP     9
    *       ICONST(50) , GAM(20)  , CONST(50) ,NRELCON   , RS(41)   ,   DISSIP    10
    *       RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHI1(41)    DISSIP    11
     COMMON/IDVARB/RK,ETH(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)   DISSIP    12
     COMMON/SVARB/T,Z     , PHI    , DT     , DZ     , DPHI   , ZINT   ,DISSIP    13
    *       ZERO   , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,   DISSIP    14
    *       TAPE2 , DISK1 , RLPH  , DISK2 , SIGM  , NPRNT , DZDT  ,    DISSIP    15
    *       DZDPH , ZM    , TMJD  , TMLD  , TMU   , TML   , TTMW  ,    DISSIP    16
    *       TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,    DISSIP    17
    *       NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,    DISSIP    18
    *       NT    , NT1   , NT2   , NT3   , PHIFD , NCONE , RNEI  ,    DISSIP    19
    *       PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,    DISSIP    20
    *       QINF                                                        DISSIP    21
     INTEGER DISK1,DISK2,TAPE1,TAPE2                                    DISSIP    22
C                                                                       DISSIP    23
C                                                                       DISSIP    24
C.....  CONST(4)<0 , LAX DAMPING                                        DISSIP    25
C.....  CONST(4)=0 , NO DAMPING                                        DISSIP    26
C.....  CONST(4)>0 , 4TH ORDER DAMPING                                 DISSIP    27
C                                                                       DISSIP    28
C                                                                       DISSIP    29
      IF(CONST(4))21,1,20                                               DISSIP    30
C...DISSIPATION TERM IN THE RADIAL DIRECTION                            DISSIP    31
 20   IF(J .GE. 5 .AND. J .LE. NT)GO TO 5                               DISSIP    32
      IF(J.LT.5) GO TO 7                                                DISSIP    33
      JD=NT                                                             DISSIP    34
      GO TO 6                                                           DISSIP    35
    7 JD=5                                                              DISSIP    36
      GO TO 6                                                           DISSIP    37
    5 JD=J                                                              DISSIP    38
    6 DISSR=-CONST(4)*0.01*(ED(N,JD+2,K)+ED(N,JD-2,K)-4.0*(ED(N,JD+1,K) DISSIP    39
     *+ED(N,JD-1,K))+6.0*ED(N,JD,K))                                    DISSIP    40
      GO TO 2                                                           DISSIP    41
 21   CONTINUE                                                          DISSIP    42
      IF(J .GE. 4 .AND. J .LE. NT1)GO TO 50                             DISSIP    43
      IF(J.LT. 4)GO TO 70                                               DISSIP    44
      JD=NT                                                             DISSIP    45
      GO TO 60                                                          DISSIP    46
 70   JD=4                                                              DISSIP    47
      GO TO 60                                                          DISSIP    48
 50   JD=J                                                              DISSIP    49
 60   DISSR=-CONST(4)*(.125*(ED(N,JD+1,K)+ED(N,JD-1,K))-0.25*ED(N,JD,K)) DISSIP    50
      GO TO 2                                                           DISSIP    51
    1 DISSR=0.0                                                         DISSIP    52
C                                                                       DISSIP    53
C                                                                       DISSIP    54
C.....  CONST(5)<0 , LAX DAMPING                                        DISSIP    55
C.....  CONST(5)=0 , NO DAMPING                                        DISSIP    56
C.....  CONST(5)>0 , 4TH ORDER DAMPING                                 DISSIP    57
C                                                                       DISSIP    58
```

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      C                                                                 DISSIP  59
       2    IF(CONST(5))31,3,11                                        DISSIP  60
60    C...DISSIPATION TERM IN THE MERIDIANOL DIRECTION                  DISSIP  61
       31   CONTINUE                                                   DISSIP  62
            IF(K .GE. 4 .AND. K .LE. NPHM1)GO TO 80                    DISSIP  63
            IF(K .LT. 4)GO TO 100                                      DISSIP  64
            KD=NPHM1                                                   DISSIP  65
65          GO TO 90                                                   DISSIP  66
       100  KD=4                                                       DISSIP  67
            GO TO 90                                                   DISSIP  68
       80   KD=K                                                       DISSIP  69
       90   DISSP=-CONST(5)*(.125*(EO(N,J,KD+1)+EO(N,J,KD-1))-0.25*EO(N,J,KD)) DISSIP  70
70          GO TO 4                                                    DISSIP  71
        11 CONTINUE                                                    DISSIP  72
            IF(K.EQ.3) P(J,1)=P(J,5)                                   DISSIP  73
            IF(K.EQ.NPHI) P(J,NPHI2)=P(J,NPHM2)                        DISSIP  74
            PF1=ABS(P(J,K+2)-2.0*P(J,K+1)+P(J,K))/(P(J,K+2)+2.0*P(J,K+1)+P(J,K DISSIP  75
75          *))                                                        DISSIP  76
            PF2=ABS(P(J,K+1)-2.0*P(J,K)+P(J,K-1))/(P(J,K+1)+2.0*P(J,K)+P(J,K-1 DISSIP  77
            *))                                                        DISSIP  78
            PF3=ABS(P(J,K)-2.0*P(J,K-1)+P(J,K-2))/(P(J,K)+2.0*P(J,K-1)+P(J,K-2 DISSIP  79
            *))                                                        DISSIP  80
80          DISSP=0.5/DETAP((PF1+PF2)*(EO(N,J,K+1)-EO(N,J,K))-         DISSIP  81
            * (PF2+PF3)*(EO(N,J,K)-EO(N,J,K-1)))*CONST(5)              DISSIP  82
            GO TO 4                                                    DISSIP  83
          3 DISSP=0.0                                                  DISSIP  84
          4 DISS=DISSP+DISSP                                           DISSIP  85
85          RETURN                                                     DISSIP  86
            END                                                        DISSIP  87
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```
      SUBROUTINE EIGEN(K4)                                                  EIGEN      2
      LEVEL 2,ETEMP,FO,FD,GO,HO                                             CVARB      2
      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                              CVARB      3
     *      FO(4,24,41)    , GG(4,24,41) , HO(4,24,41)                     CVARB      4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4    PVARB      2
     *1) ,                                                                  PVARB      3
     *      ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                   PVARB      4
     *      ROBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,       PVARB      5
     *    DTDPH(24,41), BET(41)  ,DTDZ(24,41),DTEM(41) , ACT(41)  ,       PVARB      6
     *      ICONST(50) , GAM(20)  , CONST(50) ,NREGON   , RS(41)   ,       PVARB      7
     *      RSZ(41)    , RSPHI(41), PST(41)   , RIZT(41), RSPHIT(41)       PVARB      8
      COMMON /IDVARB/NK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DELTA,TP(24)    IDVARB     2
      COMMON/SVARB/I,Z      , PHI   , DT    , DZ    , DPHI  , ZINT  ,       SVARB      2
     *      ZERO  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,       SVARB      3
     *      TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,       SVARB      4
     *      DZDPH , ZM    , TMLO  , TMID  , TMW   , TMR   , TTMW  ,       SVARB      5
     *      TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,       SVARB      6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,       SVARB      7
     *      NT    , NT1   , NT2   , NT3   , PHIFD , NCORE , RHOI  ,       SVARB      8
     *      PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,       SVARB      9
     *      GINF ,DIRM,ALPHDT,ZREF,ZOG,ZSHIFT,IFANGM                       SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                       SVARB     11
      COMMON/REALG/GAMMA,NUMPRT,BODYS,PSONIC,RSONIC,PIINF,RIINF             REALG      2
     *,VIINF,NITAVG,NJPOUT                                                  REALG      3
      COMMON/CONFG/WRHO,WR10,WRCON,GASCON,WRHO,WR50,WRAD,WRH10,WRGX         CONFG      2
      COMMON/CLUSTR/RJ,RI(24),TXI(24),TXIT(24)                              CLUSTR     2
      DIMENSION SG12(24,41),SG34(24,41)                                     EIGEN     10
C.....K4=1 IMPLYS EIGENVALUES AND STEPSIZE                                  EIGEN     11
      IPRNT=ICONST(4)                                                       EIGEN     12
      SIG12M=0.0                                                            EIGEN     13
      SIG34M=0.0                                                            EIGEN     14
      DO 1 K=3,NPHI                                                         EIGEN     15
      DO 1 J=3,NT2                                                          EIGEN     16
      T=RI(J)                                                               EIGEN     17
      A=TP(ROB(K)-RB(K))+RB(K)                                              EIGEN     18
      IF (NPEAK.EQ.-1) GO TO 50                                             EIGEN     19
      C2=GAM(1)*P(J,K)/RHO(J,K)                                             EIGEN     20
      IF(C2) 17,17,18                                                       EIGEN     21
   50 CALL MGAS(P(J,K),RHO(J,K) ,C,WPH,WRT,WRS,GASCON,WRGX,-1,2,2)          EIGEN     22
      C2=C*C                                                                EIGEN     23
      GO TO 51                                                              EIGEN     24
   17 CONTINUE                                                              EIGEN     25
      C2=-C2                                                                EIGEN     26
      GO TO (23,24),IPRNT                                                   EIGEN     27
   24 CONTINUE                                                              EIGEN     28
      WRITE(6,102) J,K                                                      EIGEN     29
   23 CONTINUE                                                              EIGEN     30
   18 CONTINUE                                                              EIGEN     31
      C=SQRT(C2)                                                            EIGEN     32
   51 CONTINUE                                                              EIGEN     33
      BP=DTDPH(J,K)*(ROB(K)-RB(K))/R                                        EIGEN     34
      G1=(V(J,K)+W(J,K)*BP)*U(J,K)                                          EIGEN     35
      GG01=U(J,K)**2*(1.0+BP**2)+(V(J,K)+W(J,K)*BP)**2-C2*(1.0+BP**2)       EIGEN     36
      IF(GG01) 19,19,20                                                     EIGEN     37
   19 CONTINUE                                                              EIGEN     38
      GG01=-GG01                                                            EIGEN     39
      WRITE(6,103) J,K                                                      EIGEN     40
```

```
      20    CONTINUE                                                  EIGEN   41
            G2=C*SQRT(GDD1)                                           EIGEN   42
   60       G3=U(J,K)**2-C2                                           EIGEN   43
            SIGB1=(G1+G2)/G3                                          EIGEN   44
            SIGB2=(G1-G2)/G3                                          EIGEN   45
            GDD2=U(J,K)**2+V(J,K)**2-C2                               EIGEN   46
            IF(GDD2) 21,21,22                                         EIGEN   47
   65       CONTINUE                                                  EIGEN   48
            GDD2=-GDD2                                                EIGEN   49
            WRITE(6,10H) J,K                                          EIGEN   50
      22    CONTINUE                                                  EIGEN   51
            G4= U(J,K)*W(J,K)                                         EIGEN   52
   70       G5=C*SQRT(GDD2)                                           EIGEN   53
            SIGB3=(G4+G5)/G3/RMDTIL(K)                                EIGEN   54
            SIGB4=(G4-G5)/G3/RMDTIL(K)                                EIGEN   55
      C.....COMPUTE LOCAL T AND PHI EIGENVALUES                       EIGEN   56
            SIG1=AMAX1(DABS(DTDZ(J,K)+SIGB1*DTDR(K))*TX(J))           EIGEN   57
   75       SIG2=AMAX1(DABS(DTDZ(J,K)+SIGB2*DTDR(K))*TX(J))           EIGEN   58
            SIG12=AMAX1(SIG1,SIG2)                                    EIGEN   59
            SIG3=ABS(SIGB3)                                           EIGEN   60
            SIG4=ABS(SIGB4)                                           EIGEN   61
            SIG34=AMAX1(SIG3,SIG4)                                    EIGEN   62
   80       SG12(J,K)=SIG12                                           EIGEN   63
            SG34(J,K)=SIG34                                           EIGEN   64
            IF(SIG12.LE.SIG12M) GO TO 2                               EIGEN   65
      C.....LOCATE MAXIMUM U-V EIGENVALUE                             EIGEN   66
            JMAX1=J                                                   EIGEN   67
   85       KMAX1=K                                                   EIGEN   68
            SIG12M=SIG12                                              EIGEN   69
            ICONST(11)=JMAX1                                          EIGEN   70
            ICONST(12)=KMAX1                                          EIGEN   71
      2     CONTINUE                                                  EIGEN   72
   90       IF(SIG34.LE.SIG34M) GO TO 3                               EIGEN   73
      C.....LOCATE MAXIMUM U-W EIGENVALUE                             EIGEN   74
            JMAX2=J                                                   EIGEN   75
            KMAX2=K                                                   EIGEN   76
            ICONST(13)=JMAX2                                          EIGEN   77
   95       ICONST(14)=KMAX2                                          EIGEN   78
            SIG34M=SIG34                                              EIGEN   79
      3     CONTINUE                                                  EIGEN   80
            GO TO (13,14),IPRNT                                       EIGEN   81
      14    CONTINUE                                                  EIGEN   82
  100       WRITE(6,100)Z,J,K,SIGB1,SIGB2,SIG1,SIG2,SIG12,SIGB3,SIGB4,SIG3,  EIGEN   83
           *SIG4,SIG34                                                EIGEN   84
      13    CONTINUE                                                  EIGEN   85
      1     CONTINUE                                                  EIGEN   86
      C.....COMPUTE STEPSIZE BASED ON MAXIMUM EIGENVALUE              EIGEN   87
  105       DZ12=DT*CONST(9)/SIG12M                                   EIGEN   88
            DZ34=DETA*CONST(9)/SIG34M                                 EIGEN   89
            IF(DZ12.GT.DZ34) GO TO 4                                  EIGEN   90
            DZDT=CONST(9)/SIG12M                                      EIGEN   91
            DE=DZDT*DT                                                EIGEN   92
  110       DZDETA=DZ/DETA                                            EIGEN   93
            ICONST(13)=100*ICONST(13)                                 EIGEN   94
            ICONST(14)=100*ICONST(14)                                 EIGEN   95
            GO TO 6                                                   EIGEN   96
      4     CONTINUE                                                  EIGEN   97
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115                DZDPH=CONST(9)/SIG34M                                          EIGEN    98
                   DZ=DZDPH*DETA                                                  EIGEN    99
                   DZDT=DZ/DT                                                     EIGEN   100
                   ICONST(11)=100*ICONST(11)                                      EIGEN   101
                   ICONST(12)=100*ICONST(12)                                      EIGEN   102
120          6     CONTINUE                                                       EIGEN   103
                   GO TO (15,16),IPRNT                                            EIGEN   104
             16    CONTINUE                                                       EIGEN   105
                   WRITE(6,101) JMAX1,KMAX1,SIG12M,JMAX2,KMAX2,SIG34M,DZ          EIGEN   106
             15    CONTINUE                                                       EIGEN   107
125          100   FORMAT(1X,F6.4,2I3,10F11.5)                                    EIGEN   108
             101   FORMAT(2I5,E12.4,5X,2I5,2E12.4)                                EIGEN   109
             102   FORMAT(1H ,42HERROR CHECK - SPEED OF SOUND IN EIGEN.  J=,I2,4H  K= EIGEN   110
                  *,                                                              EIGEN   111
                  *I2)                                                            EIGEN   112
130          103   FORMAT(1H ,39HERROR CHECK - SIGMA-BAR-1 IN EIGEN.  J=,I2,4H  K=,I2 EIGEN   113
                  *)                                                              EIGEN   114
             104   FORMAT(1H ,39HERROR CHECK - SIGMA-BAR-2 IN EIGEN.  J=,I2,4H  K=,I2 EIGEN   115
                  *)                                                              EIGEN   116
                   RETURN                                                         EIGEN   117
135                END                                                            EIGEN   118
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SUBROUTINE ESPACE    76/76   OPT=1                    FTN 4.6+460      06/15/79 18.58.36      PAGE    1

 1              SUBROUTINE ESPACE(P,NX,MX,NC1,MC1,Q)                                    ESPACE     2
                C  ESPACE     NOVEMBER 1969    CONVERT FOR 360   VARY DIMENSION       ESPACE     3
                CESPACE              LGMAX                                             ESPACE     4
                C TC1432 UPDATED NOVEMBER 1969                                         ESPACE     5
 5              C     SUBROUTINE ESPACE(P, NX, MX, NC1, MC1, Q)                        ESPACE     6
                C     EXPLANATION OF ARGUMENTS                                         ESPACE     7
                C          P = INPUT ARRAY, DEFINING DATA POINTS P(NX, MX)             ESPACE     8
                C         NX = MAXIMUM VALUE OF FIRST SUBSCRIPT OF P, WHICH EQUALS THE ESPACE     9
                C              DIMENSION OF THE DATA POINTS                            ESPACE    10
10              C         MX = MAXIMUM VALUE OF SECOND SUBSCRIPT OF P, WHICH EQUALS THE ESPACE    11
                C              NUMBER OF DATA POINTS                                   ESPACE    12
                C        NC1 = VALUE OF NX TO DEFINE DESPACED VARIABLE  (NVAR)         ESPACE    13
                C        MC1 = NUMBER OF POINTS DESIRED FOR INTERPOLATION              ESPACE    14
                C          Q = OUTPUT ARRAY Q(NX, MC1) OF INTERPOLATION RESULTS        ESPACE    15
15              C                                                                      ESPACE    16
                      DIMENSION P(2),Q(2),F(11)                                        ESPACE    17
                      INTEGER XTRUN                                                    ESPACE    18
                C     XTRUN TRANSFORMS A PAIR OF SUBSCRIPTS INTO A ONE-DIM ARRAY       ESPACE    19
                C     DIMENSION P(2),Q(2),F(11)                                        ESPACE    20
20                    XTRUN(K000FX,K001FX)=K000FX+NAX*(K001FX-1)                       ESPACE    21
                      DATA DATE /0.0/                                                  ESPACE    22
                      DATE=9999.9                                                      ESPACE    23
                      NAX=NX                                                           ESPACE    24
                      MAX=MX                                                           ESPACE    25
25                    K=2                                                              ESPACE    26
                      NC=NC1                                                           ESPACE    27
                      MC=MC1                                                           ESPACE    28
                      MCM1=MC-1                                                        ESPACE    29
                      EMC=MC                                                           ESPACE    30
30                    J1=XTRUN(NC,MAX)                                                 ESPACE    31
                      J2=XTRUN(NC,1)                                                   ESPACE    32
                      DIFF=(P(J1)-P(J2))/(EMC-1.0)                                     ESPACE    33
                      X=P(J2)                                                          ESPACE    34
                      DO 12 N=1,NAX                                                    ESPACE    35
35                    J1=XTRUN(N,1)                                                    ESPACE    36
                      J2=XTRUN(N,MC)                                                   ESPACE    37
                      J3=XTRUN(N,MAX)                                                  ESPACE    38
                      Q(J1)=P(J1)                                                      ESPACE    39
                 12   Q(J2)=P(J3)                                                      ESPACE    40
40                    DO 1 M=2,MCM1                                                    ESPACE    41
                      X=X+DIFF                                                         ESPACE    42
                      IF(DIFF) 14,15,15                                                ESPACE    43
                 14   DO 16 J=K,MAX                                                    ESPACE    44
                      J1=XTRUN(NC,J)                                                   ESPACE    45
45                    IF(P(J1)-X) 3,3,16                                               ESPACE    46
                 16   CONTINUE                                                         ESPACE    47
                      GO TO 17                                                         ESPACE    48
                 15   DO 2 J=K,MAX                                                     ESPACE    49
                      J1=XTRUN(NC,J)                                                   ESPACE    50
50                    IF(X-P(J1)) 3,3,2                                                ESPACE    51
                 2    CONTINUE                                                         ESPACE    52
                 17   WRITE (6,13)                                                     ESPACE    53
                 13   FORMAT(12HO ERR ESPACE)                                          ESPACE    54
                      RETURN                                                           ESPACE    55
55               3    K=J                                                              ESPACE    56
                      IF(J-2) 5,5,6                                                    ESPACE    57
                 5    J=3                                                              ESPACE    58
```

```
      6     KK=0                                                          ESPACE  59
            DO 8 NN=1,NRX                                                 ESPACE  60
60          IF(NN-NC) 9,8,9                                               ESPACE  61
      9     IF(KK) 10,11,10                                               ESPACE  62
     11     KK=7                                                          ESPACE  63
            DO 7 N=1,3                                                    ESPACE  64
            N1=J-3+N                                                      ESPACE  65
65          J1=XTRLW(NC,N1)                                               ESPACE  66
            J2=XTRLW(NN,N1)                                               ESPACE  67
            F(N)=P(J1)                                                    ESPACE  68
      7     F(N+3)=P(J2)                                                  ESPACE  69
            B1M2=F(1)-F(2)                                                ESPACE  70
70          B1M3=F(1)-F(3)                                                ESPACE  71
            B2M3=F(2)-F(3)                                                ESPACE  72
            BM1=X-F(1)                                                    ESPACE  73
            BM2=X-F(2)                                                    ESPACE  74
            BM3=X-F(3)                                                    ESPACE  75
75          F(9)=BM2*BM3/(B1M2*B1M3)                                      ESPACE  76
            F(10)= BM1*BM3/(B1M2*B2M3)                                    ESPACE  77
            F(11)=BM1*BM2/(B1M3*B2M3)                                     ESPACE  78
            J1=XTRLW(NN,M)                                                ESPACE  79
            J2=XTRLW(NC,M)                                                ESPACE  80
80          Q(J2)=X                                                       ESPACE  81
            GO TO 19                                                      ESPACE  82
     10     DO 18 N=1,3                                                   ESPACE  83
            N1=J-3+N                                                      ESPACE  84
            J2=XTRLW(NN,N1)                                               ESPACE  85
85     18   F(N+3)=P(J2)                                                  ESPACE  86
     19     J1=XTRLW(NN,M)                                                ESPACE  87
            Q(J1)=F(4)*F(9)+F(5)*F(10)+F(6)*F(11)                         ESPACE  88
      8     CONTINUE                                                      ESPACE  89
      1     CONTINUE                                                      ESPACE  90
90          RETURN                                                        ESPACE  91
            END                                                           ESPACE  92
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SUBROUTINE GEOM1      76/76   OPT=1                    FTN 4.6+460      06/15/79  10.58.36      PAGE     1

 1                    SUBROUTINE GEOM1(K5)                                                      GEOM1      2
                      LEVEL 2,ETEMP,EO,FO,GO,HO                                                 CVARB      2
                      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                                  CVARB      3
                     *       FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                        CVARB      4
 5                    COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4        PVARB      2
                     #1) ,                                                                      PVARB      3
                     *       RO(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                      PVARB      4
                     *       ROBPH(41) ,            RB(41)    , RBZ(41)  , RBPH(41) ,          PVARB      5
                     *      DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDP(41) , ACT(41)  ,         PVARB      6
10                   *       ICONST(50) , CAM(20)  , CONST(50) , WHEEL0N   , RS(41)  ,         PVARB      7
                     *       RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)          PVARB      8
                      COMMON /IDVARB/RK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DELTA,TP(24)        IDVARB     2
                      COMMON/SVARB/T,Z      , PHI    , DT     , DZ     , DPHI   , ZINT  ,      SVARB      2
                     *       ZERO  , PI    , ALPHA  , GAMMA  , SIGMA  , XMACH  , TAPE1 ,      SVARB      3
                     *       TAPE2 , DISK1 , ALPH   , DISK2  , SIGM   , NPRNT  , DZDT  ,      SVARB      4
15                   *       DZDPH , ZM    , TMAD   , TMED   , TMW    , TML    , TTMW  ,      SVARB      5
                     *       TTML  , RZ    , BZ     , NIPHI  , NIT    , KPHI   , NITER ,      SVARB      6
                     *       NPHI  , NPHI1 , NPHI2  , NPHI3  , NPHM1  , NPHM2  , NPHM3 ,      SVARB      7
                     *       NT    , NT1   , NT2    , NT3    , PHIFD  , NCONE  , RADI  ,      SVARB      8
20                   *       PHIF  , METHOD, LAG    , NBC    , PINF   , RHOIN  , UINF  ,      SVARB      9
                     *       GINF ,DIAM,ALENGT,ZPLF ,ZCG,ZSHIFT,IFRADM                         SVARB     10
                      INTEGER DISK1,DISK2,TAPE1,TAPE2                                           SVARB     11
                      COMMON/CLUSTR/RJ,XI(24),TXI(24),TXIT(24)                                  CLUSTR     2
                      IPRNT=ICONST(4)                                                           GEOM1      8
25                    IF(K5.EQ.2) GO TO 12                                                      GEOM1      9
                      CALL GEOM3(1,PHIP,NPHI,Z,RB,RBZ,RBPH,IPRNT,NCONE)                         GEOM1     10
                12    CONTINUE                                                                  GEOM1     11
                      CALL GEOM2(K5)                                                            GEOM1     12
                      IF(NPRNT) 3,3,4                                                           GEOM1     13
30              4     CONTINUE                                                                  GEOM1     14
                      GO TO (3,10),IPRNT                                                        GEOM1     15
                10    CONTINUE                                                                  GEOM1     16
                      WRITE(6,103)                                                              GEOM1     17
                      WRITE(6,100) Z                                                            GEOM1     18
35              3     CONTINUE                                                                  GEOM1     19
                      DO 1 J=1,NT2                                                              GEOM1     20
                      T=XI(J)                                                                   GEOM1     21
                      IF(NPRNT) 5,5,6                                                           GEOM1     22
                6     CONTINUE                                                                  GEOM1     23
40                    GO TO (5,11),IPRNT                                                        GEOM1     24
                11    CONTINUE                                                                  GEOM1     25
                      WRITE(6,101) T                                                            GEOM1     26
                5     CONTINUE                                                                  GEOM1     27
                      DO 2 K=2,NPHI1                                                            GEOM1     28
45                    PHI=PHIP(K)                                                               GEOM1     29
                      A=-(RBZ(K)-T*(ROBZ(K)-RBZ(K)))                                            GEOM1     30
                      B=-(RBPH(K)-T*(ROBPH(K)-RBPH(K)))                                         GEOM1     31
                      C=R(B(K)-RB(K)                                                            GEOM1     32
                      D=-(R(RZ(K)-RBZ(K))                                                       GEOM1     33
50                    E=-(R(BPH(K)-RBPH(K))                                                     GEOM1     34
                      DTDZ(J,K)=A/C                                                             GEOM1     35
                      DTDPH(J,K)=B/C                                                            GEOM1     36
                      DTDR(K)=1.0/C                                                             GEOM1     37
                      ACT(K)=D/C                                                                GEOM1     38
55                    BCT(K)=E/C                                                                GEOM1     39
                      R=CRT*RP(K)                                                               GEOM1     40
                      X=R*SIN(PHI)                                                              GEOM1     41
```

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                Y=-RRCOS(PHI)                                                    GEOM1   42
                IF(NPRNT) 7,7,8                                                  GEOM1   43
60          8   CONTINUE                                                         GEOM1   44
                GO TO (7,9),IPRNT                                                GEOM1   45
            9   CONTINUE                                                         GEOM1   46
                PHID=PHI*PRADI                                                   GEOM1   47
                WRITE(6,102) PHID,R,X,Y,DTDZ(J,K),DTDPH(J,K),DTDA(K),ACT(K),BCT(K) GEOM1   48
65          7   CONTINUE                                                         GEOM1   49
            2   CONTINUE                                                         GEOM1   50
            1   CONTINUE                                                         GEOM1   51
          100   FORMAT(1HO,4X,4HZ = ,F8.5)                                       GEOM1   52
          101   FORMAT(1HO,4X,4HT = ,F8.5)                                       GEOM1   53
70        102   FORMAT(1HO,7X,6HPHI = ,F10.5,3X,4HR = ,F8.5,3X,4HX = ,F8.5,      GEOM1   54
              * 3X,4HY = ,F8.5/8X,8HDT/DZ = ,F10.5,3X,10HDT/DPHI = ,F8.5,       GEOM1   55
              * 3X,8HDT/DR = ,F10.5,3X,8H(A/C)T = ,F10.5,3X,8H(B/C)T = ,F8.5)   GEOM1   56
          103   FORMAT(1H1,41X,25HMESH GEOMETRY DESCRIPTION //)                  GEOM1   57
                RETURN                                                           GEOM1   58
75              END                                                              GEOM1   59
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```
      SUBROUTINE GEOM2(K3)                                                  GEOM2      2
      LEVEL 2,ETEMP,ED,HD,GD,HD                                             GVARB      2
      COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                              GVARB      3
     *      FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                     GVARB      4
     5  COMMON /PVARB/PHD(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB      2
     *1) ,                                                                  PVARB      3
     *      RO8(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                   PVARB      4
     *      ROBPH(41) ,              RB(41)   , RBZ(41)  , RBPH(41) ,       PVARB      5
     *    DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDP(41) , ACI(41)  ,       PVARB      6
     10 *      ICONST(50) , GAM(20)  , CONST(50) ,NFLOW   , RS(41)   ,     PVARB      7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)      PVARB      8
      COMMON /IDVARB/IK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)     IDVARB     2
      COMMON/SVARB/T,Z     , PHI    , DT    , DI    , DPHI   , ZINT   ,    SVARB      2
     *      ZERO  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,       SVARB      3
     15 *      TAPE2 , DISK1 , NPH  , DISK2 , SIGM  , NPHNT , DZDT  ,     SVARB      4
     *      DZEPH , ZM    , TMLO  , TMLO  , TMU   , IM    , TIMU  ,       SVARB      5
     *      TIML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,       SVARB      6
     *      NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,       SVARB      7
     *      NT    , NT1   , NT2   , NT3   , PHIFD , NCONE , RADI  ,       SVARB      8
     20 *      PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,     SVARB      9
     *      QINF,DIAM,RLENGT,ZPEF,ZCG,ZSHIFT,IFANEM                        SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                       SVARB     11
      IF(NPRNT) 10,10,11                                                    GEOM2      7
   11 WRITE(6,101)                                                          GEOM2      8
   25 10 CONTINUE                                                           GEOM2      9
      DO 1 K=1,NPHI2                                                        GEOM2     10
      PHI=PHIP(K)                                                           GEOM2     11
      GO TO (3,2),K3                                                        GEOM2     12
    2 CONTINUE                                                              GEOM2     13
   30 RO8(K)=RS(K)                                                          GEOM2     14
      ROBZ(K)=RSZ(K)                                                        GEOM2     15
      ROBPH(K)=RSPHI(K)                                                     GEOM2     16
      GO TO 4                                                               GEOM2     17
    3 CONTINUE                                                              GEOM2     18
   35 RO8(K)=RST(K)                                                         GEOM2     19
      ROBZ(K)=RSZT(K)                                                       GEOM2     20
      ROBPH(K)=RSPHIT(K)                                                    GEOM2     21
    4 CONTINUE                                                              GEOM2     22
      IF(NPRNT) 14,14,15                                                    GEOM2     23
   40 15 CONTINUE                                                           GEOM2     24
      IF(K3.EQ.1) GO TO 14                                                  GEOM2     25
      PH=PHI*RADI                                                           GEOM2     26
      X=RO8(K)*SIN(PHI)                                                     GEOM2     27
      Y=-RO8(K)*COS(PHI)                                                    GEOM2     28
   45 WRITE(6,100) Z,PH,X,Y,RO8(K),HOBPH(K),ROBZ(K)                         GEOM2     29
   14 CONTINUE                                                              GEOM2     30
    1 CONTINUE                                                              GEOM2     31
  100 FORMAT(1H ,1X,4HZ = ,F8.5,3X,6HPHI = ,F10.5,3X,4HX = ,F8.5,3X,4HY     GEOM2     32
     *=                                                                     GEOM2     33
   50 * ,F8.5,3X,5HRS = ,F8.5,3X,10H DRS/DPHI=,F8.5,3X,9H DRS/DZ= ,F8.5)    GEOM2     34
  101 FORMAT(1H1,60X,14HSHOCK GEOMETRY //)                                  GEOM2     35
      RETURN                                                                GEOM2     36
      END                                                                   GEOM2     37
```

```
      C     GEOM3                                                       GEOM3       2
            SUBROUTINE GEOM3(K7,PHIP,NPHI,Z,RB,RBZ,RBPH,IPRNT,NCONE)    GEOM3       3
            COMMON/JOE/ZL1,CF1,CF2,ZLF,ZTRAN,DZTRAN                     JOE         2
            COMMON /ACCNT/NPECA(51)                                     ACCNT       2
            COMMON /BTEARS/ JBREAK(10),PHIBRK(10),RBREAK(10),ZSEG(7),LONG,BKK GEOM3   6
           1 ,KIND(7),RSEG(7),DSEG(7),ASEG(7),NSEG,XSEG,KPOSS,DZTINY    GEOM3       7
           2 ,NELL,LBZ(14),ZTABLE(14),YTOP(14),YSIDE(14),YBOT(14)       GEOM3       8
            DIMENSION RB(41),RBPH(41),RBZ(41),PHIP(41)                  GEOM3       9
            DIMENSION DPHIZ(14)                                         GEOM3      10
            DIMENSION BCP(15,14),LBPH(15),PHIBP(15),DRBTPH(15),DDRDZ(15) GEOM3     11
            DIMENSION ZCENT(7),RCENT(7),RADIUS(7)                       GEOM3      12
            DATA DEGP 0/57.29578/                                       GEOM3      13
      C  CODING FOR SIMPLE CIRCULAR CONES WITH CUTS.                    GEOM3      14
      C  NSEG=# OF SEGMENTS, ZSEG,RSEG = Z AND CONE R AT START OF SEGMENT. GEOM3   15
      C  DSEG,ASEG = NORMAL DISTANCE FROM CENTER TO CUT AND ANGLE THEREOF. GEOM3   16
      C  KIND = KIND OF CONTOUR.                                        GEOM3      17
      C     0 = CIRCULAR CROSS-SECTION AND LONGITUDINAL AXISYMMETRIC CIRCLE ARC GEOM3 18
      C     1 = CIRCULAR CROSS-SECTION AND LONGITUDINAL CONE.           GEOM3      19
      C     2 = CIRCULAR CROSS-SECTION WITH CHORD CUT, LONGITUDINALLY FLAT. GEOM3  20
      C     3 = ELLIPTIC CROSS-SECTION ON BOTTOM, POSSIBLY ON TOP.      GEOM3      21
      C     4 = ELLIPTIC CROSS-SECTIONS WITH DELTA R DEVIATIONS ADDED.  GEOM3      22
      C  JOE DATA ARE USED IN DECCIS AND INITA.                         GEOM3      23
      C  REGION 1 READS IN DATA ONCE. REGION 2 FINDS DATA AT Z,PHI REPEATEDLY. GEOM3 24
            IF (K7.NE.0) GO TO 2                                        GEOM3      25
          1 CONTINUE                                                    GEOM3      26
            WRITE(6,999)                                                LINE        2
        999 FORMAT(1H1)                                                 LINE        3
            READ (5,3) NSEG,(KIND(N), N=1,7)                            GEOM3      27
          3 FORMAT (8I5)                                                GEOM3      28
            READ (5,4) (ZSEG(N), N=1,NSEG)                              GEOM3      29
            READ (5,4) (RSEG(N), N=1,NSEG)                              GEOM3      30
            READ (5,4) (DSEG(N), N=1,NSEG)                              GEOM3      31
            READ (5,4) (ASEG(N), N=1,NSEG)                              GEOM3      32
          4 FORMAT (7F10.5)                                             GEOM3      33
            ZL1=ZSEG(1)                                                 GEOM3      34
            ZLF=ZSEG(NSEG)                                              GEOM3      35
            CF1=RSEG(1)                                                 GEOM3      36
            CF2=(RSEG(2)-RSEG(1))/(ZSEG(2)-ZSEG(1))                     GEOM3      37
            WRITE (6,5) NSEG,KIND,ZSEG,RSEG,DSEG,ASEG                   GEOM3      38
          5 FORMAT (1X*NSEG,KIND*8I5/1X*ZSEG*7F10.5/1X*RSEG*7F10.5/     GEOM3      39
           1                         1X*DSEG*7F10.5/1X*ASEG*7F10.5/)    GEOM3      40
      C  LOCATE CIRCULAR ARC CENTERS, IF ANY.                           GEOM3      41
      C  SPECIFY ELLIPTIC CONTOURS,IF ANY.                              GEOM3      42
            DO 7 N=1,NSEG                                               GEOM3      43
            IF (N.EQ.NSEG) GO TO 7                                      GEOM3      44
            IF (KIND(N).NE.3.AND.KIND(N).NE.4) GO TO 107                GEOM3      45
      C  KIND 3 AND 4  CODING OMITTED.                                  GEOM3      46
        107 CONTINUE                                                    GEOM3      47
            IF (KIND(N).NE.0) GO TO 7                                   GEOM3      48
            READ (5,4) ZCENT(N),RCENT(N),RADIUS(N)                      GEOM3      49
            WRITE (6,6) N,ZCENT(N),RCENT(N),RADIUS(N)                   GEOM3      50
          6 FORMAT (1X*SEGMENT*,I3,*  ZCENT,RCENT,RADIUS*,,  .5)        GEOM3      51
          7 CONTINUE                                                    GEOM3      52
            DO 110 N=1,10                                               GEOM3      53
            PHIBRK(N)=0.0                                               GEOM3      54
            RBREAK(N)=0.0                                               GEOM3      55
        110 CONTINUE                                                    GEOM3      56
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                      RETURN                                                    GEOM3    57
                    2 CONTINUE                                                  GEOM3    58
60                C  COMPUTE SHOCK RADII AND DERIVATIVES.                       GEOM3    59
                  C  FIRST, LOCATE WHICH SEGMENT Z IS IN.                       GEOM3    60
                  C  NOTE THAT LAST SEGMENT IS SIMPLY A CONTINUATION OF THE SECOND-LAST.  GEOM3  61
                                                                                GEOM3    62
                      NSEGM1=NSEG-1                                             GEOM3    63
                      NSEGP1=NSEG+1                                             GEOM3    64
65                    DO 10 N=1,NSEGM1                                          GEOM3    65
                      KSEG=N                                                    GEOM3    66
                      IF (Z.GE.ZSEG(N).AND.Z.LT.ZSEG(N+1)) GO TO 11             GEOM3    67
                   10 CONTINUE                                                  GEOM3    68
                   11 CONTINUE                                                  GEOM3    69
70                    LSEG=KSEG+1                                               GEOM3    70
                  C  COMPUTE LOCAL CROSS-SECTION GEOMETRIC CONSTANTS.           GEOM3    71
                      ZF=(Z-ZSEG(KSEG))/(ZSEG(LSEG)-ZSEG(KSEG))                 GEOM3    72
                      R=RSEG(KSEG)+ZF*(RSEG(LSEG)-RSEG(KSEG))                   GEOM3    73
                      IF (KIND(KSEG).NE.3.AND.KIND(KSEG).NE.4) GO TO 130        GEOM3    74
75                C  KIND 3 AND 4  CODING OMITTED.                              GEOM3    75
                  130 CONTINUE                                                  GEOM3    76
                      IF (KIND(KSEG).NE.0) GO TO 14                             GEOM3    77
                  C  FIND R ON CIRCULAR ARC FROM (R-RC)SQ + RADSQ - (Z-ZC)SQ    GEOM3    78
                      RRCSQ=RADIUS(KSEG)**2-(Z-ZCENT(KSEG))**2                  GEOM3    79
80                    R=SQRT(RRCSQ)+RCENT(KSEG)                                 GEOM3    80
                   14 CONTINUE                                                  GEOM3    81
                      D=DSEG(KSEG)+ZF*(DSEG(LSEG)-DSEG(KSEG))                   GEOM3    82
                      A=ASEG(KSEG)+ZF*(ASEG(LSEG)-ASEG(KSEG))                   GEOM3    83
                      IF (KIND(KSEG).NE.2) GO TO 34                             GEOM3    84
85                    DOR=D/R                                                   GEOM3    85
                      DOR =AMIN1(DOR,1.0)                                       GEOM3    86
                      DELPHI=ACOS(DOR)                                          GEOM3    87
                      PHINOM=A/(2.0*D)                                          GEOM3    88
                      PHIMIN=PHINOM-DELPHI                                      GEOM3    89
90                    PHIMAX=PHINOM+DELPHI                                      GEOM3    90
                      WFLAT=R*SIN(DELPHI)                                       GEOM3    91
                      WRITE (6,16) WFLAT                                        GEOM3    92
                   16 FORMAT (1X,*WFLAT =*,F12.6)                               GEOM3    93
                      PHIBAR(1)=PHIMAX                                          GEOM3    94
95                    RBEAR(1)=R                                                GEOM3    95
                      IF (PHIMIN.LE.0.0) GO TO 142                              GEOM3    96
                      PHIBAR(1)=PHIMIN                                          GEOM3    97
                      PHIBAR(2)=PHIMAX                                          GEOM3    98
                      RBEAR(1)=RBMLAN(2)=R                                      GEOM3    99
100                142 CONTINUE                                                 GEOM3   100
                  C..DETERMINE RB, DRB/DPHI, AND DRB/DZ FOR EACH MERIDIAN       GEOM3   101
                   34 CONTINUE                                                  GEOM3   102
                      DO 8 K=3,NPHI                                             GEOM3   103
                      PHI=PHIP(K)                                               GEOM3   104
105                   SP=SIN(PHI)                                               GEOM3   105
                      CP=COS(PHI)                                               GEOM3   106
                      S2P=SP*SP                                                 GEOM3   107
                      C2P=CP*CP                                                 GEOM3   108
                      IF (KIND(KSEG).NE.2) GO TO 15                             GEOM3   109
110                C  TEST WHETHER PHI MAY CROSSES FLAT OR CIRCLE.               GEOM3   110
                      IF (PHI.LT.PHIMIN.OR.PHI.GT.PHIMAX) GO TO 15              GEOM3   111
                  C  CODING FOR FLAT CUT CENTERED AT ANGLE PHINOM.              GEOM3   112
                  C  CURRENT CODING IS FOR FLAT CUT PARALLEL TO AXIS OF SYMMETRY.  GEOM3  113
                      RBZ(K)=0.0                                                GEOM3   113
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                  DPHI=PHI-PHINORM                                          GEOM3  114
                  COSDFI=COS(DPHI)                                          GEOM3  116
                  SINDFI=SIN(DPHI)                                          GEOM3  116
                  COSDSQ=COSDFI**2                                          GEOM3  117
                  RB(K)=D/COSDFI                                            GEOM3  118
                  DENO = DSEG(LSEG)                                         GEOM3  119
                  RBL = DENO/COSDFI                                         GEOM3  120
                  RBZ(K) = (RBL-RB(K))/(ZSEG(LSEG)-Z)                       GEOM3  121
                  IF (ABS(DPHI).LT.0.5E-01) RBPH(K)=0.0                     GEOM3  122
                  IF (ABS(DPHI).LT.0.0E+01) GO TO 20                        GEOM3  123
C  SECANT(DPHI) DIFFERENTIATED * D.                                         GEOM3  124
                  RBPH(K)=D*SINDFI/COSDSQ                                   GEOM3  125
                  GO TO 20                                                  GEOM3  126
               15 CONTINUE                                                  GEOM3  127
C  FOR POINT ON A CIRCLE                                                    GEOM3  128
                  RB(K)=R                                                   GEOM3  129
                  RBZ(K)=(RSEG(LSEG)-RSEG(KSEG))/(ZSEG(LSEG)-ZSEG(KSEG))    GEOM3  130
                  IF (KIND(KSEG).EQ.0) RBZ(K)=(ZCENT(KSEG)-Z)/(R-RCENT(KSEG))  GEOM3  131
                  RBPH(K)=0.0                                               GEOM3  132
               20 CONTINUE                                                  GEOM3  133
                  IF (KIND(KSEG).LT.2) GO TO 8                              GEOM3  134
                  IF (PHI.LT.PHIMIN.OR.PHI.GT.PHIMAX) GO TO 8               GEOM3  135
                  XFLAT=RB(K)*SP                                            GEOM3  136
                  YFLAT=-RB(K)*CP                                           GEOM3  137
                  WRITE (6,12) Z,K,PHI,RB(K),RBZ(K),RBPH(K),XFLAT,YFLAT     GEOM3  138
               12 FORMAT (1X*  Z,K,PHI,RB(K),RBZ(K),RBPH(K)*,F10.5,I5,6F12.5)  GEOM3  139
                8 CONTINUE                                                  GEOM3  140
               80 CONTINUE                                                  GEOM3  141
                  DO 36 K=1,2                                               GEOM3  142
                  M=6-K                                                     GEOM3  143
                  I=NPHI+K                                                  GEOM3  144
                  N=NPHI-K                                                  GEOM3  145
                  RB(K)=RB(M)                                               GEOM3  146
                  RB(I)=RB(N)                                               GEOM3  147
                  RBZ(K)=RBZ(M)                                             GEOM3  148
                  RBZ(I)=RBZ(N)                                             GEOM3  149
                  RBPH(K)=-RBPH(M)                                          GEOM3  150
                  RBPH(I)=-RBPH(N)                                          GEOM3  151
               36 CONTINUE                                                  GEOM3  152
                  RETURN                                                    GEOM3  153
                  END                                                       GEOM3  154
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SUBROUTINE MMACH      76/76   OPT=1                    FTN 4.6+460     08/15/79 10.58.36      PAGE    1

                      SUBROUTINE MMACH(US,THETAS,GAMMA,MMSC,THETAW,MER)                          MMACH    2
                C     SUBROUTINE TO COMPUTE MACH NUMBER AND SHOCK ANGLE GIVEN CORE               MMACH    3
                C     SEMIVERTEX ANGLE AND SURFACE VELOCITY                                      MMACH    4
                      COMMON T(27)                                                               BLANK    2
                      COMMON /CONS/PI,GAMMA1                                                     CONS     2
                      COMMON /ERINT/IER                                                          ERINT    2
                      EXTERNAL DERIV                                                             MMACH    8
                      GAMMA1=GAMMA                                                               MMACH    9
                      MER=0                                                                      MMACH   10
                      T(2)=THETAS                                                                MMACH   11
                      T(3)=0.002                                                                 MMACH   12
                      T(4)=0.0                                                                   MMACH   13
                      T(5)=US                                                                    MMACH   14
                      T2=T(2)                                                                    MMACH   15
                      T4=T(4)                                                                    MMACH   16
                      T5=T(5)                                                                    MMACH   17
                      Q1=-1.0                                                                    MMACH   18
                      CALL INTS(T,2,0.5.0E-8,0.0,0.0,0.0,0.10,0.0,0.0,0.0,DERIV)                 MMACH   19
                      IF (IER .NE. 0) GO TO 998                                                  MMACH   20
                100   CALL INTM(T,2,0.5.0E-8,0.0,0.0,0.0,0.10,0.0,0.0,0.0,DERIV)                MMACH   21
                      IF (IER .NE. 0) GO TO 998                                                  MMACH   22
                      IF(ABS(T(4))-1.0) 202,101,101                                              MMACH   23
                202   IF(ABS(T(5))-1.0) 302,101,101                                              MMACH   24
                302   IF(T(2)-1.48) 102,101,101                                                  MMACH   25
                101   MER=2                                                                      MMACH   26
                      GO TO 999                                                                  MMACH   27
                102   IF(ABS(T(4))-2.0E-7) 120,120,103                                           MMACH   28
                103   IF(ABS(T(5))-2.0E-7) 120,120,104                                           MMACH   29
                104   Q=TAN(T(2))*((1.0-T(5)**2)*(GAMMA-1.0))/(T(5)*T(4)*(GAMMA+1.0))           MMACH   30
                      IF(ABS(Q)-2.0E-7) 400,400,105                                              MMACH   31
                105   IF(Q) 106,400,109                                                          MMACH   32
                109   S1=(T(2)-T2)/(Q*Q1)                                                        MMACH   33
                110   H=S1*Q                                                                     MMACH   34
                      IF(ABS(1.0-H/T(2))-2.0E-6) 400,400,112                                     MMACH   35
                112   T(3)=H                                                                     MMACH   36
                      CALL INTS(T,2,2,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,DERIV)                 MMACH   37
                      IF (IER .NE. 0) GO TO 998                                                  MMACH   38
                      CALL INTM(T,2,2,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,DERIV)                 MMACH   39
                      IF (IER .NE. 0) GO TO 998                                                  MMACH   40
                      Q=TAN(T(2))*((1.0-T(5)**2)*(GAMMA-1.0))/(T(5)*T(4)*(GAMMA+1.0))            MMACH   41
                      IF(ABS(Q)-2.0E-7) 400,400,110                                              MMACH   42
                120   T2=T(2)                                                                    MMACH   43
                      T4=T(4)                                                                    MMACH   44
                      T5=T(5)                                                                    MMACH   45
                      Q1=Q                                                                       MMACH   46
                      GO TO 100                                                                  MMACH   47
                400   MMACH=SQRT((2.0*T(5)**2)/((GAMMA-1.0)*((COS(T(2)))**2-T(5)**2)))          MMACH   48
                      THETAW=T(2)                                                                MMACH   49
                      GO TO 999                                                                  MMACH   50
                998   MER=IER                                                                    MMACH   51
                999   RETURN                                                                     MMACH   52
                      END                                                                        MMACH   53
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      SUBROUTINE INITA                                                    INITA      2
      LEVEL 2,ETEMP,EO,FO,GO,HO                                           CVAMB      2
      COMMON/LAML2/ETEMP(4,24,41),EO(4,24,41),                            CVAMB      3
     *      FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                    CVAMB      4
      COMMON /PVAMB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4  PVAMB      2
     *1) ,                                                                PVAMB      3
     *      ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                 PVAMB      4
     *      ROBPH(41)  ,            RH(41)    , RBZ(41)  , RBPH(41) ,     PVAMB      5
     *      DTDPH(24,41), BCT(41)  ,DTV(24,41),DTLP(41) , ACT(41)  ,      PVAMB      6
     *      ICONST(10) , GAM(20)  , CONST(50) ,AREA    , RS(41)   ,       PVAMB      7
     *      RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)      PVAMB      8
      COMMON /IDVAMB/RK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DELTA,TP(24)  IDVAMB     2
      COMMON/SVAMB/T,Z      , PHI    , DT     , DZ     , DPHI   , ZINT  , SVAMB      2
     *      ZEND  , PI     , ALPHA , GAMMA , SIGMA , RMACH , TAPE1 ,      SVAMB      3
     *      TAPE2 , DISK1  , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,      SVAMB      4
     *      DZDPH , ZM     , TMAO  , TMU   , TMW   , TM    , TTMW  ,      SVAMB      5
     *      TTML  , RZ     , BZ    , NIPHI , NIT   , KPHI  , NITER ,      SVAMB      6
     *      NPHI  , NPHI1  , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,      SVAMB      7
     *      NT    , NT1    , NT2   , NT3   , PHIFD , NFAME , RADI  ,      SVAMB      8
     *      PHIF  , METHOD, LAG   , NBC   , PINF  , RMUIN , UINF  ,       SVAMB      9
     *      QINF ,DIAM,REYNLD,ZMCF,ZCG,ZSHIFT,IFORM                       SVAMB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                     SVAMB     11
      COMMON/JOE/ZL1,CF1,CF2,ZLF,ZTRAN,DZTRAN                             JOE        2
      COMMON/REALG/VIRC ,NARPHT,BOCTH,BUGYS,PSONIC,RSONIC,PIINF,RIINF    REALG      2
     *,VIINF,NITRIG,NARDUT                                                REALG      3
      COMMON COMRG/WRPU,WRRD,WRTO,WRCON,GASCON,WRHO,WRSO,WRAD,WRRTO,WRGX  CONRG      2
      COMMON ENTRO/S(41),ZBS,ZOLD,ITPRTB,ITPRTF,NCASE,NTDSDS              ENTRO      2
      COMMON CLUSTR/RJ,XI(24),TXI(24),TXIT(24)                            CLUSTR     2
      DIMENSION YA(24),UA(24) VA(24),RHOA(24),PA(24),THA(24)              INITA     12
      RADI=57.29578                                                       INITA     13
      PI=3.1415926                                                        INITA     14
      IF(ICONST(48).EQ.1) ZINT=Z                                          INITA     15
      IF(ICONST(48).NE.1) Z=ZINT                                          INITA     16
      ZTINT=ZINT                                                          INITA     17
      ALPH=ALPHA/RADI                                                     INITA     18
      SIGM=SIGMA/RADI                                                     INITA     19
      PHIF=180.0/RADI                                                     INITA     20
      NPHI=NIPHI+3                                                        INITA     21
      NPHI1=NPHI+1                                                        INITA     22
      NPHI2=NPHI+2                                                        INITA     23
      NPHM1=NPHI-1                                                        INITA     24
      NPHM2=NPHI-2                                                        INITA     25
      NT=NIT+2                                                            INITA     26
      NT1=NT+1                                                            INITA     27
      NT2=NT+2                                                            INITA     28
      ICONST(1)=1                                                         INITA     29
      ICONST(10)=1                                                        INITA     30
      IPRNT=ICONST(4)                                                     INITA     31
      IF (ICONST(48).NE.1) ICONST(5)=0                                    INITA     32
      LAG=1                                                               INITA     33
      DELTA=PHIF/NIPHI                                                    INITA     34
      DPHI=DELTA                                                          INITA     35
      DT=1.0/(NT-1)                                                       INITA     36
      DZ=DZDT*DT                                                          INITA     37
      DZDPH=DZ/DELTA                                                      INITA     38
      GAM(1)=(GAMMA-1.0)*0.5                                              INITA     39
      GAM(2)=GAM(1)/GAMMA                                                 INITA     40
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      C..MERIDIONAL CLUSTERING.                                          INITA   41
            IF(PX .EQ. 0.0) GO TO 35                                     INITA   42
   60       YD=0.5*PX*PX*(1.0+((SP(PX)-1.0)*PI*IFD/180.0)*             INITA   43
           *(1.0-(1.0-EXP(-PX))*PI*IFD/180.0))                         INITA   44
            YDI=SIN(PX*PX)                                             INITA   45
            YDI=YDI/(PX*PI*IFD/RADI)                                   INITA   46
      35    CONTINUE                                                   INITA   47
            DO 55 II=2,NP+11                                           INITA   48
   65       ETA(II)=(II-3)*DI                                          INITA   49
            IF(PX .LE. 0.0) GO TO 40                                   INITA   50
            PHIP(II)=ETA(II)                                           INITA   51
            DTIL(II)=1.0                                               INITA   52
   70       DTILE(II)=0.0                                              INITA   53
            GO TO 55                                                   INITA   54
      40    CONTINUE                                                   INITA   55
            YDI=PI*(ETA(II)/PI-YD)                                     INITA   56
            SHETA=SIN(YDI)                                             INITA   57
   75       CHETA=COS(YDI)                                             INITA   58
            PHIP(II)=ATAN2(PX*SHETA,(1.0+SHETA/YDI)                    INITA   59
            DTIL(II)=CHETA*(1.0+SHETA/YDI)                             INITA   60
            DTILE(II)=-PX*PX*SHETA/(CHETA**2                           INITA   61
      55    CONTINUE                                                   INITA   62
   80       PHIP(2)= PHIP(4)                                           INITA   63
            PHIP(NP+11)= PHIP(NP+M1)                                   INITA   64
            DTIL(2)=DTIL(4)                                            INITA   65
            DTIL(NP+11)=DTIL(NP+M1)                                    INITA   66
            DTILE(2)= DTILE(4)                                         INITA   67
   85       DTILE(NP+11)=-DTILE(NP+M1)                                 INITA   68
            DTIL(3)=1.0                                                INITA   69
            DTILE(3)=0.0                                               INITA   70
      C..PARIS CLUSTERING.                                             INITA   71
            SIN2P=SIN(PX)                                              INITA   72
   90       DO 56 II=1,NP2                                             INITA   73
            TP(II)=(II-3)*DI                                           INITA   74
            IF(P .EQ. 0.0) GO TO 41                                    INITA   75
            DT=P*TP(II)                                                INITA   76
            SDT=SIN(DT)                                                INITA   77
   95       CDT=COS(DT)                                                INITA   78
            PI(II)=ATAN2(SIN2P*SDT,CDT)                                INITA   79
            TP(II)=SIN2P*(P*CDT)                                       INITA   80
            TAIT(II)=SIN2P*P*SDT/(CDT**2                               INITA   81
            GO TO 42                                                   INITA   82
  100       41    PI(II)=TP(II)                                        INITA   83
            TP(II)=1.0                                                 INITA   84
            TPIT(II)=0.0                                               INITA   85
      42    CONTINUE                                                   INITA   86
      56    CONTINUE                                                   INITA   87
  105       IF (SIN(4*PI/4.0,-1) GAP/2)+1.0                            INITA   88
            IF(IDIR) 8,8,9                                             INITA   89
      8     DIR=1                                                      INITA   90
      9     IF(IDIR-2) 10,10,11                                        INITA   91
      10    DIR2=1                                                     INITA   92
  110       11    IF(NCORE) 12,12,13                                   INITA   93
      12    NCORE=1                                                    INITA   94
      13    CONTINUE                                                   INITA   95
            IF(ICONST(4))16,16,17                                      INITA   96
      16    ICONST(4)=1                                                INITA   97
```

```
      17    CONTINUE                                                          INITA   98
            IF(TAPE(1) 1,1,20                                                 INITA   99
      1     TAPE(1)=1                                                         INITA  100
            IF(TAPE(2) 4,4,26                                                 INITA  101
      4     TAPE(2)=1                                                         INITA  102
      26    CONTINUE                                                          INITA  103
      20    CONTINUE                                                          INITA  104
C                                                                             INITA  105
C...CALCULATE FREE STREAM QUANTITIES                                          INITA  106
C                                                                             INITA  107
            GAM(1)=GAMMA/(GAMMA-1.0)                                          INITA  108
            GAM(4)=1.0/(GAMMA-1.0)                                            INITA  109
            AA=1.0+GAM(1)*AMACH**2                                            INITA  110
            BB=AA-1.0                                                         INITA  111
            PINF=1.0/AA**GAM(1)                                               INITA  112
            RHOINF=1.0/AA**(GAM(4)                                            INITA  113
            QINF=SQRT(0.5*BB)                                                 INITA  114
            CONST(1)=COS(ALPHA)                                               INITA  115
            CONST(2)=SIN(ALPHA)                                               INITA  116
            UINF=QINF*CONST(2)                                                INITA  117
      IF (TAPE(4).EQ.-1) UINF=CONST(2)*VINF                                   INITA  118
            DO 3 K=2,NPHI1                                                    INITA  119
            PHI=PHI+DPHI                                                      INITA  120
            VINF(K)=-QINF*CONST(1)*COS(PHI)                                   INITA  121
            WINF(K)=QINF*CONST(1)*SIN(PHI)                                    INITA  122
      IF (TAPE(4).EQ.0) GO TO 14                                              INITA  123
            VINF(K)=VINF(K)*VINF/QINF                                         INITA  124
            WINF(K)=WINF(K)*VINF/QINF                                         INITA  125
      14    CONTINUE                                                          INITA  126
      3     CONTINUE                                                          INITA  127
      2     CONTINUE                                                          INITA  128
            CALL OUTPUT(1)                                                    INITA  129
            WRITE(6,105)                                                      INITA  130
            WRITE(6,106) (II,TP(II),RI(II),THI(II), AIT(II),II=3,NT2)         INITA  131
            WRITE(6,101)                                                      INITA  132
            WRITE(6,100) (II,ETA(II),PHIP(II),GTIL(II),GTILP(II),II=2,NPHI1)  INITA  133
            IF(II.NE.NPHI) GO TO 27                                           INITA  134
            IF(TAPE(2).EQ.1.AND.DISK1.NE.1.AND.DISK2.NE.1) GO TO 30           INITA  135
            GO TO 31                                                          INITA  136
      30    CONTINUE                                                          INITA  137
C...CALCULATE INITIAL SOLUTION IF ALPHA IS DIFFERENT FROM ZERO                INITA  138
            ZSTA=ZINT-ZSHIFT                                                  INITA  139
            THETA=SIGN                                                        INITA  140
            CALL START(THETAS,RMACH,GAMMA,ZSTA,0.0,NT,NT,PP,R,VA,RHOA,PA,MER, INITA  141
           *THA)                                                              INITA  142
            DO 32 K=3,NPHI                                                    INITA  143
            DO 33 J=3,NT2                                                     INITA  144
            P(J,K)=PP(J-2)                                                    INITA  145
            RHO(J,K)=RHOA(J-2)                                                INITA  146
            U(J,K)=UA(J-2)                                                    INITA  147
            V(J,K)=VA(J-2)                                                    INITA  148
            W(J,K)=0.0                                                        INITA  149
      33    CONTINUE                                                          INITA  150
            PS(K)=VA(NT)+ZSTA*TAN(SIGN)                                       INITA  151
            PSZ(K)=PS(K)/ZSTA                                                 INITA  152
      32    CONTINUE                                                          INITA  153
            PSPHI(3)=0.0                                                      INITA  154
```

133

```
                RSPHI(NPHI)=0.0                                                 INITA   155
                DO 34 K=1,NPHI                                                  INITA   156
             34 RSPHI(K)=(RS(K+1)-RS(K-1))/(2.0*DELTA)*DTIL(P)                  INITA   157
175             GO TO 27                                                        INITA   158
             31 CONTINUE                                                        INITA   159
                IF(TAPE2.EQ.2) GO TO 39                                         INITA   160
                C                                                               INITA   161
                C..READ INITIAL DATA FROM DISK1                                 INITA   162
180             C                                                               INITA   163
                GO TO(6,7,7),DISK1                                              INITA   164
              6 CONTINUE                                                        INITA   165
                READ(12) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI ),J=3,N INITA   166
               *T2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                            INITA   167
185             ZINT=Z                                                          INITA   168
                WRITE(6,102)                                                    INITA   169
                REWIND 12                                                       INITA   170
              7 CONTINUE                                                        INITA   171
                C                                                               INITA   172
190             C..READ INITIAL DATA FROM DISK2                                 INITA   173
                C                                                               INITA   174
                GO TO (18,19,19),DISK2                                          INITA   175
             18 CONTINUE                                                        INITA   176
                READ(11) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI ),J=3,N INITA   177
195            *T2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                           INITA   178
                ZINT=Z                                                          INITA   179
                WRITE(6,109)                                                    INITA   180
                REWIND 11                                                       INITA   181
             19 CONTINUE                                                        INITA   182
200          5  CONTINUE                                                        INITA   183
                C                                                               INITA   184
                C..READ INITIAL DATA FROM PUNCHED CARDS                         INITA   185
                C                                                               INITA   186
                IF(TAPE2.EQ.1.OR.TAPE2.EQ.3) GO TO 27                           INITA   187
205             READ(5,111) Z                                                   INITA   188
                READ(5,112) ((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI),J=3, INITA   189
               * NT2)                                                           INITA   190
                READ(5,113) (RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                    INITA   191
                ZINT=Z                                                          INITA   192
210             WRITE(6,110)                                                    INITA   193
             27 CONTINUE                                                        INITA   194
                DO 25 K=1,2                                                     INITA   195
                M=6-K                                                           INITA   196
                I=NPHI+K                                                        INITA   197
215             N=NPHI-K                                                        INITA   198
                RS(I)=RS(N)                                                     INITA   199
                RS(I)=RS(N)                                                     INITA   200
                RSZ(K)=RSZ(M)                                                   INITA   201
                RSZ(I)=RSZ(N)                                                   INITA   202
220             RSPHI(K)=-RSPHI(M)                                              INITA   203
                RSPHI(I)=-RSPHI(N)                                              INITA   204
             25 CONTINUE                                                        INITA   205
                C.........WRITE TAPE - INITIAL DATA AND BODY SHAPE              INITA   206
                GO TO (21,22,21),TAPE1                                          INITA   207
225          22 CONTINUE                                                        INITA   208
                DDZ=(ZEND-ZINT)/100.0                                           INITA   209
                Z=ZINT                                                          INITA   210
             23 CONTINUE                                                        INITA   211
```

```
      CALL GEOMS(1,PHIF,NPHI,Z,RR,RBZ,RBPH,IPRNT,NCONE)
      Z=Z+DZZ
      IF(Z-ZEND) 23,24,24
   24 CONTINUE
      Z=ZINT
      ICONT(1)=1
   21 CONTINUE
      ZM=P(3,3)/ABS(RHO(3,3))**GAMMA
      ZM=ABS(ZM)
      DO 38 K=3,NPHI
      IF (NPERL.EQ.-1) GO TO 39
      S(K)=P(3,K)/ABS(RHO(3,K))**GAMMA
      S(K)=ABS(S(K))
      GO TO 38
   39 CONTINUE
      CALL FGAS(P(3,K),RHO(3,K),SOUND,ENTH,TEM,S(K),GASCON,WMGX,-1,4,2)
   38 CONTINUE
      S(2)=S(4)
      S(NPHI1)=S(NPHIM1)
      IF (NPERL.NE.-1) GO TO 29
   37 CONTINUE
      CALL AGAS(P(3,3),RHO(3,3),SOUND,ENTH,TEM,BODYS,GASCON,WMGX,-1,4,2)
      BODYV2=U(3,3)*U(3,3)+V(3,3)*V(3,3)+W(3,3)*W(3,3)
      BODYH=ENTH+BODYV2*0.5
   29 CONTINUE
      IF (NPRINT.NE.0) WRITE(6,114) BODYH,BODYS,BODYV2
      CALL GEOMS(1,PHIF,NPHI,Z,RB,RBZ,RBPH,IPRNT,NCONE)
      CALL GEOMS(2)
  100 FORMAT(1H ,5X,2HI=,I2,3X,4HETA=,E11.4,3X,4HPHI=,E11.4,3X,
     * [illegible]=,E11.4,3X [illegible]=,E11.4)
  101 FORMAT(1H1,[illegible] MESH DESCRIPTION,/)
  102 FORMAT(1H0,[illegible] FIELD DATA WAS READ FROM DISK1)
  103 FORMAT(1H1,[illegible] MESH DESCRIPTION,/)
  104 FORMAT(1H1,[illegible] GEOMETRY INPUT)
  105 FORMAT(1H ,5X,[illegible]=,I2,3X,4HTAU=,E11.4,3X,4HXI =,E11.4,3X,5HTXI =,
     * E11.4,3X,[illegible] =,E11.4)
  109 FORMAT(1H0,[illegible] FIELD DATA WAS READ FROM DISK2)
  110 FORMAT(1H0,[illegible] FIELD DATA WAS READ FROM [illegible] CARDS)
  111 FORMAT(E15.6)
  112 FORMAT(5E15.6)
  113 FORMAT(5E15.6)
  114 FORMAT(1H0,[illegible]BODY STREAM LINE CONSTANTS.   HT=,1PE13.6,1X,2HS=
     11PE13.6,1X,5HV**2=1PE13.6)
      RETURN
      END
```

```
SUBROUTINE INITIL     76/76   OPT=1                    FTN 4.6+460        06/13/79  18.58.36        PAGE     1

 1                    SUBROUTINE INITIL                                                 INITIL     2
                      COMMON/CONRG/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX                 CONRG1     2
                      COMMON/REALG/NREAL,NWRPRT,BODY4,BODY5,PSONIC,RSONIC,P1INF,R1INF   REALG      2
                     *,V1INF,NITAVG,NWROUT                                              REALG      3
 5                    DATA I123/0/                                                      INITIL     5
                      IF (I123.EQ.123) RETURN                                           INITIL     6
                      GX=1.4                                                            INITIL     7
                      I123=123                                                          INITIL     8
                C     PO=ATM PRES IN UNITS LBS PER FT**2                                INITIL     9
10                    PO=2116.                                                          INITIL    10
                      CONC=0.996291                                                     INITIL    11
                C     RO=STGD DENSITY IN SLUGS PER FT**3                                INITIL    12
                      RO=0.00237*CONC                                                   INITIL    13
                C     TO=STGD TEMP                                                      INITIL    14
15                    TO=493.675                                                        INITIL    15
                C     RRR=SPECIFIC GAS CONSTANT                                         INITIL    16
                      RRR=1716.0/CONC                                                   INITIL    17
                      GASCON=RRR                                                        INITIL    18
                      CALL RGAS(PO,RO,AO,HO,TO,SO,RRR,GX,-1.4,2)                        INITIL    19
20                    RTO=GASCON*TO                                                     INITIL    20
                 86   CONTINUE                                                          INITIL    21
                      IF (NWRPRT.GE.1) GO TO 87                                         INITIL    22
                      RETURN                                                            INITIL    23
                 87   WRITE (6,88) PO,RO,TO,CONC,GASCON,HO,SO,   AO,RTO,GX             INITIL    24
25               88   FORMAT(1HO,26HFROM INITIL - PRT /CONRG/  /1H ,3HPO=1PE13.6,1X,    INITIL    25
                     *13HRO=1PE13.6,1X,3HTO=1PE13.6,1X,5HCONC=1PE13.6,1X,3HRR=1PE13.6,1X,  INITIL  26
                     *3HHO=1PE13.6,1X,3HSO=1PE13.6/1H ,3HAO=1PE13.6,1X,4HRTO=1PE13.6,1X,   INITIL  27
                     *3HGX=1PE13.6)                                                     INITIL    28
                      RETURN                                                            INITIL    29
30                    END                                                               INITIL    30
```

```
      SUBROUTINE INPUT                                                  INPUT     2
      LEVEL 2,ETEMP,ED,FD,GD,HD                                         CVARB     2
      COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                          CVARB     3
     *     FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                  CVARB     4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB     2
     *1) ,                                                              PVARB     3
     *     ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                PVARB     4
     *     RIEPH(41)  ,            PB(41)   , PBZ(41)  , PBPH(41) ,     PVARB     5
     *    DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTE(41) , ACTE(41)  ,     PVARB     6
     *     ICONST(50) , GAM(20)  , CONST(50) ,NTE=ION   , RS(41)   ,     PVARB     7
     *     RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)     PVARB     8
      COMMON /IDVARB/RK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24) IDVARB    2
      COMMON/SVARB/T,Z    , PHI   , DT    , DZ    , DPHI  , ZINT  ,     SVARB     2
     *     ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,     SVARB     3
     *     TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPRNT , DZDT  ,     SVARB     4
     *     DZDPH , ZM    , TMLD  , TMLD  , TMU   , TML   , TTMU  ,     SVARB     5
     *     TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,     SVARB     6
     *     NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,     SVARB     7
     *     NT    , NTI   , NT2   , NT3   , PHIFD , NCONE , RAJ   ,     SVARB     8
     *     PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,     SVARB     9
     *     QINF,DIAM,RLENGT,ZREF,ZCG,ZSHIFT,IPANUM                      SVARB    10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                   SVARB    11
      COMMON/PERLG/PERL,NGUPRT,BOUTH,BODYS,PSONIC,RSONIC,PIINF,RIINF    REALG     2
     *,VIINF,NITAVG,NWOUT                                               REALG     3
      COMMON/CONFG/UNFD,UMPD,UMTD,UMCON,GASCON,UMHD,UMSD,UMAD,UMMTD,UMGA CONFG     2
      COMMON/ENTRD/S(41),ZBS,ZFLD,ITPRTB,ITPRTF,NCASE,NTDSKS            ENTRD     2
      COMMON/CLUSTR/RJ,RB(24),TXI(24),TXII(24)                          CLUSTR    2
C                                                                       INPUT    11
      READ(5,105) XMACH,ALPHA,GAMMA,NREAL                               INPUT    12
C                                                                       INPUT    13
C..XMACH=MACH NUMBER                                                    INPUT    14
C..ALPHA=ANGLE OF ATTACK(DEGREES)                                       INPUT    15
C..GAMMA=RATIO OF SPECIFIC HEATS                                        INPUT    16
C..NREAL=0 FOR PERFECT GAS, -1 FOR REAL AIR                             INPUT    17
C                                                                       INPUT    18
      READ(5,100) PHIFD,RK,RJ                                           INPUT    19
C                                                                       INPUT    20
C..RJ= RADIAL CLUSTERING PARAMETER                                      INPUT    21
C..RK= MERIDIONAL CLUSTERING PARAMETER.                                 INPUT    22
C..PHIFD=MERIDIONAL ANGLE ABOUT WHICH POINTS ARE CLUSTERED.             INPUT    23
C                                                                       INPUT    24
      READ(5,101)NIT,NIPHI,NITER,ICONST(49),NCONE                       INPUT    25
C                                                                       INPUT    26
C..NIT=NUMBER OF POINTS BETWEEN BODY AND SHOCK                          INPUT    27
C..NIPHI=NUMBER OF INTERVALS IN MERIDIONAL DIRECTION                    INPUT    28
C..NITER=NUMBER OF INTEGRATION STEPS DESIRED                            INPUT    29
C.. NWUPRT=CONTROL OF REAL GAS ITERATION AND OTHER MONITOR PRINTING.     INPUT    30
C..       SET NWUPRT=0 FOR LEAST PRINTED OUTPUT.                        INPUT    31
C.. NWOUT=                                                              INPUT    32
C..ICONST(49)= STEPSIZE COMPUTED EVERY INCONST(49) ITERATIONS.          INPUT    33
C..NCONE=CONTROL VARIABLE FOR CONE SOLUTION(1) OR AFTERBODY SOLUTION(2) INPUT    34
C                                                                       INPUT    35
      READ(5,100) CONST(9),CONST(4),CONST(5)                            INPUT    36
C.. CONST(9)=COURANT NUMBER (USUALLY SET TO 0.9)                        INPUT    37
C..CONST(4)=FOURTH ORDER DISSIPATION CONST IN R DIRECTION               INPUT    38
C..CONST(5)=FOURTH ORDER DISSIPATION CONSTANT IN THE PHI DIRECTION      INPUT    39
C                                                                       INPUT    40
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      READ(5,102) DISK1,DISK2,TAPE1,TAPE2,NTDSDS                        INPUT  41
C                                                                        INPUT  42
C..DISK1=1 TO READ DISK1, 2 TO WRITE DISK1, 3 TO DO NOTHING              INPUT  43
C..DISK2=1 TO READ DISK2, 2 TO WRITE DISK2, 3 TO DO NOTHING              INPUT  44
C..TAPE1=1 TO DO NOTHING, 2 STORES BODY SHAPE AND WRITES DATA ON TAPE,   INPUT  45
C        3 WRITES DATA ONLY ON TAPE                                      INPUT  46
C..TAPE2=1 TO DO NOTHING, 2 TO READ STARTING SOLN FROM DATA CARDS        INPUT  47
C        3 STORE SOLUTION ON PUNCHED CARDS                               INPUT  48
C..NTDSDS=0-DO NOTHING; 1-PUNCH; 2-WRITE TAPE FOR 3-D 5-D-5 STARTING SOL INPUT  49
C        IF NTDSDS>0, LAST DATA CARD SHOULD CONTAIN MACH1 AND LAMBDA     INPUT  50
C        TO BE USED IN SUBROUTINE OUTPUT                                 INPUT  51
C                                                                        INPUT  52
      READ(5,104) ZBS,ZFLD,ITPRTB,ITPRTF,NCASE                           INPUT  53
C                                                                        INPUT  54
C..ZBS=INCREMENT IN Z FOR PRINTING BODY AND SHOCK VARIABLES              INPUT  55
C..ZFLD=INCREMENT IN Z FOR PRINTING FIELD VARIABLES                      INPUT  56
C..ITPRTB=NO. OF ITERATION FOR PRINTING BODY AND SHOCK VARIABLES         INPUT  57
C...ITPRTF=NO. OF ITERATIONS FOR PRINTING FIELD VARIABLES                INPUT  58
C..NCASE=IF NCASE>0,THEN NEW CASE FOLLOWS                                INPUT  59
C                                                                        INPUT  60
      READ(5,105)DIAM,RLENGT,ZREF,ZCG,ZSHIFT,IFNOM                       INPUT  61
C                                                                        INPUT  62
C..VALUES USED IN FORCE AND MOMENT CALCULATIONS OR IN SHIFTING ORGIN OF  INPUT  63
C  SHARP CONE SOLUTION                                                   INPUT  64
C..DIAM= LENGTH USED IN CALCULATING REFERENCE AREA,USUALLY MAX DIAMETER   INPUT  65
C..RLENGT= REFERENCE LENGTH USED IN CALCULATING MOMENTS                  INPUT  66
C..ZREF= MOMENT REFERENCE CENTER                                         INPUT  67
C..ZCG = CENTER OF GRAVITY LOCATION FOR STATIC MARGIN CALCULATION        INPUT  68
C..ZSHIFT= THE VALUE OF Z WHICH CORRESPONDS TO THE STARTING CONE ORGIN,  INPUT  69
C        IF NO SHIFT SET=0                                               INPUT  70
C..IFNOM= 0 IF FORCE AND MOMENTS ARE DESIRED, = 1 IF NOT DESIRED         INPUT  71
  100 FORMAT(5F10.5,)                                                    INPUT  72
  101 FORMAT(5I5)                                                        INPUT  73
  102 FORMAT(5I5)                                                        INPUT  74
  103 FORMAT(3E15.8,5F,I5)                                               INPUT  75
  104 FORMAT(2F10.5,3I5)                                                 INPUT  76
  105 FORMAT(5F10.5,I5)                                                  INPUT  77
  999 RETURN                                                             INPUT  78
      END                                                                INPUT  79
```

```
1                SUBROUTINE INTS(T,M,L,E ,B,C,HMA ,HMI ,BET,DERIV)                  INTS      2
                 COMMON /ERINT/IER                                                  ERINT     2
                 DOUBLE PRECISION XX,XS,EU,P,A,HMAX,HMIN,BETA,EL ,H,XO,AK,EN,D,D14  INTS      4
                1 ,TL1,TL2,TL3,TL4,TL5,TL6                                          INTS      5
5                DIMENSION T(100),XX(4),XS(2)                                       INTS      6
                 EQUIVALENCE (TEM,ITEM)                                             INTS      7
                 IER=0                                                              INTS      8
                 K=L                                                                INTS      9
                 N=M                                                                INTS     10
10               N3=3*N                                                             INTS     11
                 N5=5*N                                                             INTS     12
                 N2=2*N                                                             INTS     13
                 N4=4*N                                                             INTS     14
                 N6=6*N                                                             INTS     15
15               N10=10*N                                                           INTS     16
                 EU=E                                                               INTS     17
                 P=B                                                                INTS     18
                 JN=0                                                               INTS     19
                 A=C                                                                INTS     20
20               XS(1)=T(2)                                                         INTS     21
                 HMAX=HMA                                                           INTS     22
                 IF (HMAX .LE.0.D0)HMAX=1.0D38                                      INTS     23
                 HMIN=HMI                                                           INTS     24
                 ITEM=N                                                             INTS     25
25               T(1)=TEM                                                           INTS     26
                 IF (K-1) 1,2,2                                                     INTS     27
           1     IF (P .LE.0.D0)P=100.0D0                                           INTS     28
                 IF (A .LE.0.D0) A=1.D0                                             INTS     29
                 BETA=BET                                                           INTS     30
30               IF (BETA .LE.0.D0.OR. BETA .GE. 1.D0)BETA=0.5D0                    INTS     31
                 EL=EU/P                                                            INTS     32
           2     J=0                                                                INTS     33
                 ISTEP=4                                                            INTS     34
                 H=T(3)                                                             INTS     35
35               CALL DERIV                                                         INTS     36
                 IF(IER.NE.0) RETURN                                                INTS     37
                 GO TO 25                                                           INTS     38
                 ENTRY INTM                                                         INTS     39
          10     IF (K-1) 20,11,20                                                  INTS     40
40        11     XO=T(2)                                                            INTS     41
                 XX(2)=XO+HH*0.5D0                                                  INTS     42
                 XX(1)=XX(2)                                                        INTS     43
                 XX(4)=XO+H                                                         INTS     44
                 XX(3)=XX(4)                                                        INTS     45
45               DO 16 JJ=1,4                                                       INTS     46
                 T(2)=XX(JJ)                                                        INTS     47
                 DO 12 I=1,N                                                        INTS     48
                 II= 3+I                                                            INTS     49
                 IJ=II+N                                                            INTS     50
50               IK=IJ+N                                                            INTS     51
                 IL=IK+N                                                            INTS     52
                 AK=HH*T(IJ)                                                        INTS     53
                 GO TO (13,14,15,16),JJ                                             INTS     54
          13     T(IK)=T(II)                                                        INTS     55
55               T(IL)=AK                                                           INTS     56
                 T(II)=T(IK)+0.5D0*AK                                               INTS     57
                 GO TO 12                                                           INTS     58
```

1

```
                14    T(II)=T(IK)+0.500*AK                                    INTS     59
                17    T(IL)=T(IL)+2.000*AK                                    INTS     60
60                    GO TO 12                                                INTS     61
                15    T(II)=T(IK)+AK                                          INTS     62
                      GO TO 17                                                INTS     63
                18    T(II)=T(IK)+(T(IL)-AK)/6.000                            INTS     64
                12    CONTINUE                                                INTS     65
65                    CALL DERIV                                              INTS     66
                      IF(IER.NE.0) RETURN                                     INTS     67
                16    CONTINUE                                                INTS     68
                25    IF (K .EQ. 1) RETURN                                    INTS     69
                      DO 21 I=1,N2                                            INTS     70
70                    II=3+I                                                  INTS     71
                      IJ=II+N2*(J+2)                                          INTS     72
                21    T(IJ)=T(II)                                             INTS     73
                      RETURN                                                  INTS     74
                20    IF (J .GE. 3) GO TO 22                                  INTS     75
75                    J=J+1                                                   INTS     76
                      GO TO 11                                                INTS     77
                22    DO 23 I=1,N                                             INTS     78
                      II=3+I                                                  INTS     79
                      IJ=II+N5                                                INTS     80
80                    IK=IJ+N2                                                INTS     81
                      IL=IK+N2                                                INTS     82
                      IM=IL+N2                                                INTS     83
                      IN=IL+N                                                 INTS     84
                      IP=II+N3                                                INTS     85
85                    T(IP)=19.000*T(IM)-5.000*T(IL)+T(IK)                    INTS     86
                23    T(II)=T(IN)+H/24.00*(55.00*T(IM)-59.00*T(IL)+37.00*T(IK)INTS     87
                     1    -9.00*T(IJ))                                       INTS     88
                      AS(2)=T(2)                                              INTS     89
                      A0=AS(2)                                                INTS     90
90                    T(2)=A0+H                                               INTS     91
                      CALL DERIV                                              INTS     92
                      IF(IER.NE.0) RETURN                                     INTS     93
                      DO 24 I=1,N                                             INTS     94
                      II=3+I                                                  INTS     95
95                    IJ=II+N2                                                INTS     96
                      T(IJ)=T(II)                                             INTS     97
                      IL=II+2*N5                                              INTS     98
                      IK=II+N                                                 INTS     99
                      IP=II+N3                                                INTS    100
100                   T(II)=T(IL)+H/24.00*(9.000*T(IK)+T(IP))                 INTS    101
                24    CONTINUE                                                INTS    102
                      IF (K .EQ. 2) GO TO 30                                  INTS    103
                      EN=0                                                    INTS    104
                      DO 27 I=1,N                                             INTS    105
105                   TEST1=T(I+3)                                            INTS    106
                26    D=DMAX1(DABS(TEST1         ),A)                         INTS    107
                      D14=14.000*D                                            INTS    108
                      II=3+N2+I                                               INTS    109
                      TEST2=T(II)                                             INTS    110
110             27    EN=DMAX1(DABS((TEST2-TEST1)/D14),EN)                    INTS    111
                      IF (EN .GE. EU) GO TO 28                                INTS    112
                      JP=4                                                    INTS    113
                      IF (EN .LT. EL) GO TO 29                                INTS    114
                31    ISTEP=ISTEP+1                                           INTS    115
```

```
      GO TO 30                                                          INTS   116
   29 IF (ISTEP .LT. 6) GO TO 31                                        INTS   117
      IF(DABS(H/BETA) .GT. HMAX) GO TO 30                               INTS   118
      H=H/BETA                                                          INTS   119
      T(3)=H                                                            INTS   120
      GO TO 2                                                           INTS   121
   28 IF(DABS(H*BETA) .LT. HMIN) GO TO 30                               INTS   122
      H=H*BETA                                                          INTS   123
      T(3)=H                                                            INTS   124
      IF (JN.GE. 4) GO TO 40                                            INTS   125
      J=0                                                               INTS   126
      DO 32 I=1,N                                                       INTS   127
      II=3+I                                                            INTS   128
      IJ=II+NN                                                          INTS   129
   32 T(II)=T(IJ)                                                       INTS   130
      T(2)=XS(I)                                                        INTS   131
      CALL DERIV                                                        INTS   132
      IF(IER.NE.0) RETURN                                               INTS   133
      GO TO 25                                                          INTS   134
   40 T(2)=XS(2)                                                        INTS   135
      J=0                                                               INTS   136
      DO 41 I=1,N                                                       INTS   137
      II=3+I                                                            INTS   138
      IJ=II+N10                                                         INTS   139
   41 T(II)=T(IJ)                                                       INTS   140
      CALL DERIV                                                        INTS   141
      IF(IER.NE.0) RETURN                                               INTS   142
      GO TO 25                                                          INTS   143
   30 CALL DERIV                                                        INTS   144
      IF(IER.NE.0) RETURN                                               INTS   145
      DO 42 I=1,N6                                                      INTS   146
      II=3+I+NN                                                         INTS   147
      IJ=II+N2                                                          INTS   148
   42 T(II)=T(IJ)                                                       INTS   149
      DO 43 I=1,N2                                                      INTS   150
      II=3+I                                                            INTS   151
      IJ=II+N10                                                         INTS   152
   43 T(IJ)=T(II)                                                       INTS   153
      RETURN                                                            INTS   154
      END                                                               INTS   155
```

```
      SUBROUTINE IDCON(K1)                                                  IDCON      2
      LEVEL 2,ETEMP,EQ,FO,GO,HO                                             CVARB      2
      COMMON/LARGE/ETEMP(4,24,41),EQ(4,24,41),                              CVARB      3
     *     FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                      CVARB      4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4    PVARB      2
     *1) ,                                                                  PVARB      3
     *     RGB(41)    , RGBZ(41) , VINF(41) , WINF(41) ,                    PVARB      4
     *     RGBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,        PVARB      5
     *    DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,       PVARB      6
     *     ICONST(50) , GAM(20)   , CONST(50) ,NREGON   , RS(41)   ,       PVARB      7
     *     RSZ(41)    , RSPHI(41), RST(41)    , RSZT(41), RSPHIT(41)      PVARB      8
      COMMON /IDVARB/RK,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)     IDVARB     2
      COMMON/SVARB/T,Z     , PHI    , DT     , DZ     , DPHI   , ZINT   ,  SVARB      2
     *     ZERO   , PI    , ALPHA  , GAMMA  , SIGMA  , XMACH  , TAPE1  ,  SVARB      3
     *     TAPE2  , DISK1 , ALPH   , DISK2  , SIGM   , NPRNT  , DZDT   ,  SVARB      4
     *     DZDPH  , ZM    , THLO   , THLD   , THW    , THL    , TTHW   ,  SVARB      5
     *     TTHL   , RZ    , BZ     , NIPHI  , NIT    , KPHI   , NITER  ,  SVARB      6
     *     NPHI   , NPHI1 , NPHI2  , NPHI3  , NPHM1  , NPHP2  , NPHM3  ,  SVARB      7
     *     NT     , NT1   , NT2    , NT3    , PHIFD  , NLONE  , RAD1   ,  SVARB      8
     *     PHIF   , METHOD, LAG    , NBC    , PINF   , RHOIN  , UINF   ,  SVARB      9
     *     QIN    ,DIAM,NLENGT,ZREF,ZCG,ZSHIFT,IFRAGM                      SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                       SVARB     11
      COMMON/REALGAS/GL,NWPRT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF         REALG      2
     *,V1INF,NITAVG,NGROUT                                                  REALG      3
      COMMON/WRK00/RWR,BWR,CWR,DWR,UWR,VWR,WWR,PWR,RHOWR,WRC1,NEWR,NTAL     WRK00      2
      COMMON/WRK01/K,J,NPHIWR,NT2WR,WRMACH,PKKFLW,WRZ                       WRK01      2
      COMMON/CONRG/GAMMO,WRO,WRTO,WRCON,GASCON,WRHO,WPSO,WRAO,WRRTO,WRGX     CONRG      2
      COMMON /ACCNT/NREC(51)                                                ACCNT      2
      COMMON/CLUSTR/RJ,RI(24) TXI(24),TXIT(24)                              CLUSTR     2
      DIMENSION E(4),F(4),G(4),H(4)                                         IDCON     13
      DIMENSION GOOF(6)                                                     IDCON     14
      COMMON/LIBOO/NTEST(11),NCRTA,NOSKY(4),NCRTB(3),NSWCH(32),IN(32)       IDCON     15
      DATA GOOF/4HLPRO,4HR IN,4H IOC,4HO  ,6H   J,,4H=  /                   IDCON     16
      JERK=1                                                                IDCON     17
      NON=NREC(1)-2                                                         IDCON     18
  780 IF(JERK.EQ.2)  GO TO 2                                                IDCON     19
      II=K1+1                                                               IDCON     20
      GO TO (5,5,2),II                                                      IDCON     21
    5 CONTINUE                                                              IDCON     22
      DO 3 K=2,NPHI1                                                        IDCON     23
      DO 3 J=3,NT2                                                          IDCON     24
      T=RI(J)                                                               IDCON     25
C..CODE CONSERVATIVE VARIABLES                                              IDCON     26
      R=T*(RGB(K)-RB(K))+RB(K)                                              IDCON     27
      RR=RHO(J,K)                                                           IDCON     28
      PP=P(J,K)                                                             IDCON     29
      UU=U(J,K)                                                             IDCON     30
      VV=V(J,K)                                                             IDCON     31
      WW=W(J,K)                                                             IDCON     32
      IF(NSWCH(11) .GT. 0)GO TO 10                                          IDCON     33
      A=DTDZ(J,K)                                                           IDCON     34
      B=DTDR(K)                                                             IDCON     35
      C=DTDPH(J,K)                                                          IDCON     36
      D=RGB(K)-RB(K)                                                        IDCON     37
      IF(J .EQ. 3)GO TO 4875                                                IDCON     38
      RJM1=RI(J-1)*D+RB(K)                                                  IDCON     39
      VSTAR1=DTDZ(J-1,K)*U(J-1,K)+B*V(J-1,K)+DTDPH(J-1,K)*W(J-1,K)/RJM1     IDCON     40
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                      VSTAR1=VSTAR1*UU/U(J-1,K)                                          IDCON    91
                 4875 VSTAR2=AP*U+B*VV+C*WW/R                                            IDCON    92
           60         IF(J .EQ. NT2)GO TO 4775                                           IDCON    93
                      RJP1=XI(J+1)*D+RB(K)                                               IDCON    94
                      VSTAR3=DTDZ(J+1,K)*U(J+1,K)+B*V(J+1,K)+DTDPH(J+1,K)*W(J+1,K)/RJP1  IDCON    95
                      VSTAR3=VSTAR3*UU/U(J+1,K)                                          IDCON    96
                 4775 CONTINUE                                                           IDCON    97
           65         IF(II-1)4,4,6                                                      IDCON    98
                 4    VBAR=VSTAR2                                                        IDCON    99
                      IF(J .LE. 4)GO TO 14                                               IDCON   100
                      IF(J .GE. (NT2-1))GO TO 14                                         IDCON   101
                      IF(VSTAR2 .GT. VSTAR1)VBAR=0.5*(VSTAR2+VSTAR1)                     IDCON   102
           70         WBAR=WW                                                            IDCON   103
                      IF(WW .GT. W(J,K-1))WBAR=0.5*(WW+W(J,K-1))                         IDCON   104
                      GO TO 10                                                           IDCON   105
                 6    VBAR=VSTAR2                                                        IDCON   106
                      IF(J .LE. 4)GO TO 15                                               IDCON   107
           75         IF(J .GE. (NT2-1))GO TO 15                                         IDCON   108
                      IF(VSTAR3 .GT. VSTAR2)VBAR=0.5*(VSTAR3+VSTAR2)                     IDCON   109
                 15   WBAR=WW                                                            IDCON   110
                      IF(W(J,K+1) .GT. WW)WBAR=0.5*(W(J,K+1)+WW)                         IDCON   111
                 10   CONTINUE                                                           IDCON   112
           80         E(1)=RR*UU                                                         IDCON   113
                      E(2)=GAM(2)*PP+E(1)*UU                                             IDCON   114
                      E(3)=E(1)*VV                                                       IDCON   115
                      E(4)=E(1)*WW                                                       IDCON   116
                      IF(NSWCH(11))11,11,12                                              IDCON   117
           85         CONTINUE                                                           IDCON   118
                      F(1)=RR*VV                                                         IDCON   119
                      F(2)=F(1)*UU                                                       IDCON   120
                      F(3)=GAM(2)*PP+F(1)*VV                                             IDCON   121
                      F(4)=F(1)*WW                                                       IDCON   122
           90         G(1)=RR*WW/R                                                       IDCON   123
                      G(2)=G(1)*UU                                                       IDCON   124
                      G(3)=G(1)*VV                                                       IDCON   125
                      G(4)=(GAM(2)*PP+RR*WW**2)/R                                        IDCON   126
                      H(1)=F(1)/R                                                        IDCON   127
           95         H(2)=H(1)*UU                                                       IDCON   128
                      H(3)=RR*(VV**2-WW**2)/R                                            IDCON   129
                      H(4)=2.0*G(3)                                                      IDCON   130
                      GO TO 13                                                           IDCON   131
                 11   CONTINUE                                                           IDCON   132
          100         D=(UU+2)*PP                                                        IDCON   133
                      E(1)=RR*WBAR                                                       IDCON   134
                      E(2)=RR*D+E(1)*UU                                                  IDCON   135
                      E(3)=RR*D+E(1)*VV                                                  IDCON   136
                      E(4)=D*R/R+E(1)*WW                                                 IDCON   137
          105         G(1)=RR*WBAR/R                                                     IDCON   138
                      G(2)=G(1)*UU                                                       IDCON   139
                      G(3)=G(1)*VV                                                       IDCON   140
                      G(4)=D/R+G(1)*WW                                                   IDCON   141
                      H(1)=RR*VV/R-ACT(K)*E(1)-(BCT(K)+DTILE(K))*RR*WW/R-TXIT(J)*RR*VV   IDCON   142
          110         PP=RR*VV*UU/R                                                      IDCON   143
                      H(2)=RR      -ACT(K)*E(2)-(BCT(K)+DTILE(K))*RR*WW*UU/R-TXIT(J)*RR*V IDCON   144
                     &V*UU                                                               IDCON   145
                      H(3)=RR*(VV**2-WW**2)/R-ACT(K)*E(3)-(BCT(K)+DTILE(K))*RR*WW*VV/R-  IDCON   146
                     &TXIT(J)*(GAM(2)*PP+RR*VV**2)                                       IDCON   147
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                H(N)=2.0*RRRVV*UU/P-ACT(K)*E(N)-(BCT(K)+DTILE(K))*(GAM(2)*FP+RRRUU IOCON     98
               &**2)/R-TXIT(J)*RRR*VV*UU                                          IOCON     99
            13  CONTINUE                                                          IOCON    100
                DO 16 N=1,4                                                       IOCON    101
                IF(NSWCH(11) .GT. 0)F(N)=DTDZ(J,K)*E(N)+DTDP(K)*F(N)+DTDPH(J,K)*  IOCON    102
               &  G(N)                                                            IOCON    103
                IF(NSWCH(11) .GT. 0)H(N)=H(N)-ACT(K)*E(N)-(BCT(K)-DTILE(K))*G(N)- IOCON    104
               &TXIT(J)*F(N)                                                      IOCON    105
                H(N)=H(N)                                                         IOCON    106
                F(N)=F(N)*TXI(J)                                                  IOCON    107
                G(N)=G(N)*DTIL(K)                                                 IOCON    108
            16  CONTINUE                                                          IOCON    109
                GO TO (17,18),II                                                  IOCON    110
            17  CONTINUE                                                          IOCON    111
            C..SET CONSERVATIVE VARIABLES AT N                                    IOCON    112
                DO 20 N=1,4                                                       IOCON    113
                EO(N,J,K)=E(N)                                                    IOCON    114
                FO(N,J,K)=F(N)                                                    IOCON    115
                GO(N,J,K)=G(N)                                                    IOCON    116
                HO(N,J,K)=H(N)                                                    IOCON    117
            20  CONTINUE                                                          IOCON    118
                GO TO 3                                                           IOCON    119
            18  CONTINUE                                                          IOCON    120
            C..SET CONSERVATIVE VARIABLES AT N+1 TILDE                            IOCON    121
                DO 9 N=1,4                                                        IOCON    122
                IF(J.EQ.NT2) GO TO 36                                             IOCON    123
                GO TO 35                                                          IOCON    124
            C..RESET ETEMP AT BODY AND SHOCK                                      IOCON    125
            36  ETEMP(N,J,K)=E(N)                                                 IOCON    126
            35  CONTINUE                                                          IOCON    127
                FO(N,J,K)=F(N)                                                    IOCON    128
                GO(N,J,K)=G(N)                                                    IOCON    129
                HO(N,J,K)=H(N)                                                    IOCON    130
            9   CONTINUE                                                          IOCON    131
            3   CONTINUE                                                          IOCON    132
                RETURN                                                            IOCON    133
            2   CONTINUE                                                          IOCON    134
            C..DECODE CONSERVATIVE VARIABLES--PERFECT GAS.                        IOCON    135
                IF (NREAL.EQ.-1) GO TO 50                                         IOCON    136
                AA=1.0-GAM(2)                                                     IOCON    137
                DO 1 K=3,NPHI                                                     IOCON    138
                DO 1 J=3,NT2                                                      IOCON    139
                IF(JEX.EQ.2)  GO TO 779                                           IOCON    140
                A=ETEMP(1,J,K)                                                    IOCON    141
                B=ETEMP(2,J,K)                                                    IOCON    142
                C=ETEMP(3,J,K)                                                    IOCON    143
                D=ETEMP(4,J,K)                                                    IOCON    144
                BB=-B/A                                                           IOCON    145
                V(J,K)=C/A                                                        IOCON    146
                W(J,K)=D/A                                                        IOCON    147
                CC=GAM(2)*(1.0-V(J,K)**2-W(J,K)**2)                               IOCON    148
                DD=BB**2-4.0*AA*CC                                                IOCON    149
                IF(DD) 7,8,8                                                      IOCON    150
            7   CONTINUE                                                          IOCON    151
            C                                                                     IOCON    152
            779 CONTINUE                                                          IOCON    153
            C                                                                     IOCON    154
```

```
                DD=0.0                                                          IDCON   155
              8 CONTINUE                                                        IDCON   156
                U(J,K)=(-BB+SQRT(DD))/(2.0*AA)                                  IDCON   157
    175         RHO(J,K)=A/U(J,K)                                               IDCON   158
                P(J,K)=RHO(J,K)*(1.0-U(J,K)**2-V(J,K)**2-W(J,K)**2)             IDCON   159
              1 CONTINUE                                                        IDCON   160
                RETURN                                                          IDCON   161
              C..DECODE CONSERVATIVE VARIABLES --REAL GAS.                      IDCON   162
    180       50 CONTINUE                                                       IDCON   163
                IF (XMACH.EQ.WRMACH) GO TO 54                                   IDCON   164
                WRMACH=XMACH                                                    IDCON   165
                PRESSW=CAMB(1)/GAMMA                                            IDCON   166
                NPHIWR=NPHI                                                     IDCON   167
    185         NT2WR=NT2                                                       IDCON   168
              54 CONTINUE                                                       IDCON   169
                DO 51 K=3,NPHI                                                  IDCON   170
                DO 51 J=3,NT2                                                   IDCON   171
                AWR=ETEMP(1,J,K)                                                IDCON   172
    190         BWR=ETEMP(2,J,K)                                                IDCON   173
                CWR=ETEMP(3,J,K)                                                IDCON   174
                DWR=ETEMP(4,J,K)                                                IDCON   175
                VWR=CWR/AWR                                                     IDCON   176
                WWR=DWR/AWR                                                     IDCON   177
    195         WRZ=Z                                                           IDCON   178
                CALL RDCODE(P(J,K),RHO(J,K),U(J,K),NR)                          IDCON   179
                IF (NR.NE.0) GO TO 52                                           IDCON   180
                V(J,K)=VWR                                                      IDCON   181
                W(J,K)=WWR                                                      IDCON   182
    200         GO TO 51                                                        IDCON   183
              52 WRITE (6,53) J,K,ICONST(5)                                     IDCON   184
              51 CONTINUE                                                       IDCON   185
              53 FORMAT(1HO,1X,43HERROR IN IDCON (REAL GAS) - PROGRAM EXITING,5X,IDCON   186
                 12HJ=,I3,3X,2HK=,I3,3X,7H ICOI= ,I4)                           IDCON   187
    205       100 FORMAT(1HO,1X,34HERROR IN IDCON - PROGRAM CONTINUES/5X,2HJ=,I3,3X,IDCON   188
                *2HK=,I3,3X,8HGISCPIM=,F10.6,3X,8H JUDI = ,I4)                  IDCON   189
                RETURN                                                          IDCON   190
                END                                                             IDCON   191
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      C    MULLER
           SUBROUTINE MULLER(COE,N1,ROOTR,ROOTI)
           DIMENSION COE(16),ROOTR(15),ROOTI(15)
      C    DIMENSION COE(16),ROOTR(15),ROOTI(15)
           N2=N1+1
           NN=0
           I=N1+1
      19   IF(COE(I))9,7,9
      7    NN=NN+1
           ROOTR(NN)=0.0
           ROOTI(NN)=0.0
           I=I-1
           IF(NN-N1)19,37,19
      9    CONTINUE
      10   AXR=0.8
           AXI=0.0
           L=1
           N3=1
           ALP1R=AXR
           ALP1I=AXI
           M=1
           GOTO99
      11   BET1R=TEMR
           BET1I=TEMI
           AXR=0.85
           ALP2R=AXR
           ALP2I=AXI
           M=2
           GOTO99
      12   BET2R=TEMR
           BET2I=TEMI
           AXR=0.9
           ALP3R=AXR
           ALP3I=AXI
           M=3
           GOTO99
      13   BET3R=TEMR
           BET3I=TEMI
      14   TE1=ALP1R-ALP3R
           TE2=ALP1I-ALP3I
           TE5=ALP3R-ALP2R
           TE6=ALP3I-ALP2I
           TEM=TE5*TE5+TE6*TE6
           TE3=(TE1*TE5+TE2*TE6)/TEM
           TE4=(TE2*TE5-TE1*TE6)/TEM
           TE7=TE3+1.0
           TE9=TE3*TE3-TE4*TE4
           TE10=2.0*TE3*TE4
           DE15=TE7*BET3R-TE4*BET3I
           DE16=TE7*BET3I+TE4*BET3R
           TE11=TE3*BET2R-TE4*BET2I+BET1R-DE15
           TE12=TE3*BET2I+TE4*BET2R+BET1I-DE16
           TE7=TE9-1.0
           TE1=TE9*BET2R-TE10*BET2I
           TE2=TE9*BET2I+TE10*BET2R
           TE13=TE1-BET1R-TE7*BET3R+TE10*BET3I
           TE14=TE2-BET1I-TE7*BET3I-TE10*BET3R
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                      TE15=DE15*TE3-DE16*TE4                                    MULLER   59
                      TE16=DE15*TE4+DE16*TE3                                    MULLER   60
   60                 TE1=TE15*TE15-TE16*TE16-4.0*(TE11*TE15-TE12*TE16)         MULLER   61
                      TE2=2.0*TE15*TE16-4.0*(TE12*TE15+TE11*TE16)               MULLER   62
                      TEM=SQRT(TE1*TE1+TE2*TE2)                                 MULLER   63
                      IF(TE1)115,115,112                                        MULLER   64
                113   TE4=SQRT(.5*(TEM-TE1))                                    MULLER   65
   65                 IF(TE4.EQ.0.0) GO TO 111                                  MULLER   66
                      TE3=.5*TE2/TE4                                            MULLER   67
                      GO TO 111                                                 MULLER   68
                112   TE3=SQRT(.5*(TEM+TE1))                                    MULLER   69
                      IF(TE2)110,200,200                                        MULLER   70
   70                 110 TE3=-TE3                                              MULLER   71
                      200 TE4=.5*TE2/TE3                                        MULLER   72
                      111 TE7=TE15+TE3                                          MULLER   73
                      TE8=TE16+TE4                                              MULLER   74
                      TE9=TE15-TE3                                              MULLER   75
   75                 TE10=TE16-TE4                                             MULLER   76
                      TE1=2.0*TE15                                              MULLER   77
                      TE2=2.0*TE16                                              MULLER   78
                      IF(TE7*TE7+TE8*TE8-TE9*TE9-TE10*TE10)204,204,205          MULLER   79
                204   TE3=TE9                                                   MULLER   80
   80                 TE8=TE10                                                  MULLER   81
                205   TEM=TE7*TE7+TE8*TE8                                       MULLER   82
                      IF(TEM.EQ.0.0) GO TO 6                                    MULLER   83
                      TE3=(TE1*TE7+TE2*TE8)/TEM                                 MULLER   84
                      TE4=(TE2*TE7-TE1*TE8)/TEM                                 MULLER   85
   85           6     AR=ALPSR*TE3*TE5-TE4*TE6                                  MULLER   86
                      AI=ALPSI+TE3*TE6+TE4*TE5                                  MULLER   87
                      ALPSR=AR                                                  MULLER   88
                      ALPSI=AI                                                  MULLER   89
                      M=4                                                       MULLER   90
   90                 GO TO 99                                                  MULLER   91
                 15   N6=1                                                      MULLER   92
                 38   IF(ABS(HELL)-ABS(BELL)-1.E-20)18,19,16                    MULLER   93
                 16   TE7=ABS(ALPSR-AR)+ABS(ALPSI-AI)                           MULLER   94
                      IF(TE7/(ABS(AR)+ABS(AI))-1.E-7)18,18,17                   MULLER   95
   95            17   N5=N5+1                                                   MULLER   96
                      ALP1R=ALP2R                                               MULLER   97
                      ALP1I=ALP2I                                               MULLER   98
                      ALP2R=ALPSR                                               MULLER   99
                      ALP2I=ALPSI                                               MULLER  100
  100                 ALPSR=ALPMR                                               MULLER  101
                      ALPSI=ALPMI                                               MULLER  102
                      BET1R=BET2R                                               MULLER  103
                      BET1I=BET2I                                               MULLER  104
                      BET2R=BETSR                                               MULLER  105
  105                 BET2I=BETSI                                               MULLER  106
                      BETSR=TEMR                                                MULLER  107
                      BETSI=TEMI                                                MULLER  108
                      IF(N5-100)14,18,18                                        MULLER  109
                 18   MM=MM+1                                                   MULLER  110
  110                 ROOTR(MM)=ALPMR                                           MULLER  111
                      ROOTI(MM)=ALPMI                                           MULLER  112
                      N5=0                                                      MULLER  113
                 91   IF(MM-N1)90,37,37                                         MULLER  114
                 90   IF(ABS(ROOTI(MM))-1.E-5)10,10,91                          MULLER  115
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115          31    GO TO(32,103),A                                          MULLER  116
             32    AXR=ALP1R                                                MULLER  117
                   AXI=-ALP1I                                               MULLER  118
                   ALP1I=-ALP1I                                             MULLER  119
                   M=5                                                      MULLER  120
120                GO TO 99                                                 MULLER  121
             33    BET1R=TEMR                                               MULLER  122
                   BET1I=TEMI                                               MULLER  123
                   AXR=ALP2R                                                MULLER  124
                   AXI=-ALP2I                                               MULLER  125
125                ALP2I=-ALP2I                                             MULLER  126
                   M=6                                                      MULLER  127
                   GO TO 99                                                 MULLER  128
             34    BET2R=TEMR                                               MULLER  129
                   BET2I=TEMI                                               MULLER  130
130                AXR=ALP3R                                                MULLER  131
                   AXI=-ALP3I                                               MULLER  132
                   ALP3I=-ALP3I                                             MULLER  133
                   L=2                                                      MULLER  134
                   M=3                                                      MULLER  135
135          99    TEMR=COE(1)                                              MULLER  136
                   TEMI=0.0                                                 MULLER  137
                   DO100I=1,N1                                              MULLER  138
                   TE1=TEMR*P R-TEMI*AXI                                    MULLER  139
                   TEMI=TEMI-AXR*TEMR*AXI                                   MULLER  140
140          100   TEMR=      TE1+COE(I+1)                                  MULLER  141
                   HELL=TEMR                                                MULLER  142
                   BELL=TEMI                                                MULLER  143
             42    IF(NN)102,105,102                                        MULLER  144
             102   DO101I=1,NN                                              MULLER  145
145                TEMI=A*R-ROOTR(I)                                        MULLER  146
                   TEMQ=AXI-ROOTI(I)                                        MULLER  147
                   TE1=TEMI*TEMI+TEMQ*TEMQ                                  MULLER  148
                   TE2=(TEMR*TEMI+TEMI*TEMQ)/TE1                            MULLER  149
                   TEMI=(TEMI*TEMI-TEMR*TEMQ)/TE1                           MULLER  150
150          101   TEMR=TE2                                                 MULLER  151
             103   GO TO(11,12,13,15,39,34),M                               MULLER  152
             37    RETURN                                                   MULLER  153
                   END                                                      MULLER  154
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      SUBROUTINE OUTPUT(K2)                                                  OUTPUT     2
      LEVEL 2,ETEMP,EO,FO,GO,HO                                              OUTPUT     2
      COMMON/LARGE/ETEMP(4,24,41),EO(4,24,41),                               CVARB      3
     *     FO(4,24,41)    , GO(4,24,41) , HO(4,24,41)                        CVARB      4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4     PVARB      2
     *1) ,                                                                   PVARB      3
     *     ROB(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                     PVARB      4
     *     ROBPH(41)  ,            RB(41)   , RBZ(41)  , RBPH(41) ,         PVARB      5
     *    DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR(41) , ACT(41)  ,         PVARB      6
     *     ICONST(50) , GAM(20)  , CONST(50) ,NREGON   , RS(41)   ,         PVARB      7
     *     RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)         PVARB      8
      COMMON /IDVARB/RX,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24)      IDVARB     2
      COMMON/SVARB/T,Z     , PHI   , DT    , DZ    , DPHI  , ZINT  ,         SVARB      2
     *     ZEND  , PI    , ALPHA , GAMMA , SIGMA , XMACH , TAPE1 ,         SVARB      3
     *     TAPE2 , DISK1 , ALPH  , DISK2 , SIGM  , NPHNT , DZDT  ,         SVARB      4
     *     DZDPH , ZM    , TMAD  , TMLD  , TMW   , TML   , TIMW  ,         SVARB      5
     *     TTML  , RZ    , BZ    , NIPHI , NIT   , KPHI  , NITER ,         SVARB      6
     *     NPHI  , NPHI1 , NPHI2 , NPHI3 , NPHM1 , NPHM2 , NPHM3 ,         SVARB      7
     *     NT    , NT1   , NT2   , NT3   , PHIFD , NCONE , RADI  ,         SVARB      8
     *     PHIF  , METHOD, LAG   , NBC   , PINF  , RHOIN , UINF  ,         SVARB      9
     *     QINF,DIAM,ALENGT,ZREF,ZCG,ZSHIFT,IFANDM                          SVARB      10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                        SVARB      11
      COMMON/REALG/NREAL,NWRMRT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF        REALG      2
     *,V1INF,NITMAX,NWROUT                                                   REALG      3
      COMMON/CONRG/WRPO,WRRO,WRTO,WRCON,GASCON,WRHO,WRSO,WRAO,WRRTO,WRGX     CONRG      2
      COMMON/ENTRO/S(41),ZbS,ZFLD,ITPFTB,ITPRTF,NCASE,NTOSOS                 ENTRO      2
      COMMON/CLUSTR/RJ,ZI(24),TXI(24),TXIT(24)                               CLUSTR     2
      DIMENSION YS(41)                                                       OUTPUT     11
      DIMENSION FCUT(100),XX(814),YY(814),ZZ(814)                            OUTPUT     12
      INTEGER CARUNO                                                         OUTPUT     13
      IF (NREAL.EQ.0) GO TO 17                                               OUTPUT     14
      IF (NWROUT.EQ.0) GO TO 17                                              OUTPUT     15
      IF ((P1INF.EQ.P1INFP).AND.(R1INF.EQ.R1INFP).AND.(V1INF.EQ.V1INFP))     OUTPUT     16
     1GO TO 17                                                               OUTPUT     17
      P1INFP=P1INF                                                           OUTPUT     18
      R1INFP=R1INF                                                           OUTPUT     19
      V1INFP=V1INF                                                           OUTPUT     20
      CALL PGAS(P1INF,R1INF,WRFS,HWRFS,TWRFS,SWRFS,GASCON,WRGX,-1.4,2)       OUTPUT     21
      HTWRFS=HWRFS+(V1INF**2)*0.5                                            OUTPUT     22
      VMAXH=SQRT(ABS(HTWRFS)*2.0)                                            OUTPUT     23
      PSTAG=PGAS(HTWRFS,SWRFS,0.)                                            OUTPUT     24
      RSTAG=PSTAG*GAMMA/((GAMMA-1.)*VMAXH**2)                                OUTPUT     25
   17 CONTINUE                                                               OUTPUT     26
      GO TO (1,2,3,4,5,6,14,15,19),K2                                        OUTPUT     27
    1 CONTINUE                                                               OUTPUT     28
C                                                                            OUTPUT     29
C..OUTPUT INITIAL INPUT DATA                                                 OUTPUT     30
C                                                                            OUTPUT     31
      WRITE(6,100) XMACH,ALPHA,GAMMA,SIGMA                                   OUTPUT     32
      WRITE(6,101) ZINT,ZEND,PHIFD                                           OUTPUT     33
      WRITE (6,102) NIT,NIPHI,ICONST(2),NITER,NPHNT,ICONST(4),NCONE,         OUTPUT     34
     *NBC,PINF,NREAL                                                         OUTPUT     35
      WRITE(6,103) DZDT,CONST(4),CONST(5)                                    OUTPUT     36
      WRITE(6,104) DISK1,DISK2,TAPE1,TAPE2                                   OUTPUT     37
      WRITE(6,115) CONST(9),METHOD,NBC,MK,RJ                                 OUTPUT     38
      IF (NREAL.EQ.-1)                WRITE (6,123) P1INF,R1INF,V1INF        OUTPUT     39
     1,BODYH,BODYS                                                           OUTPUT     40
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                IF (NREAL.EQ.-1) WRITE (6,126) PSTAG,RSTAG,VMAXH,HWRFS,SWRFS      OUTPUT    41
                WRITE(6,116) PINF,RHOIN,QINF                                      OUTPUT    42
60              WRITE (6,128) GASCON                                              OUTPUT    43
                DO 16 K=3,NPHI                                                    OUTPUT    44
                PHI=PHIP(K)*RADI                                                  OUTPUT    45
                IF (NREAL.EQ.0)   WRITE (6,117) K,PHI,UINF,VINF(K),WINF(K)        OUTPUT    46
                IF (NREAL.EQ.-1)  WRITE (6,124) K,PHI,UINF,VINF(K),WINF(K)        OUTPUT    47
65        16    CONTINUE                                                          OUTPUT    48
                GO TO 7                                                           OUTPUT    49
          2     CONTINUE                                                          OUTPUT    50
          C                                                                       OUTPUT    51
          C..OUTPUT ALL FLOW FIELD VARIABLES                                      OUTPUT    52
70        C                                                                       OUTPUT    53
                I=0                                                             OUTPUT    54
                DO 9 K=3,NPHI                                                   OUTPUT    55
                PHI=PHIP(K)*RADI                                                OUTPUT    56
                WRITE(6,105) K,PHI,Z                                            OUTPUT    57
75              IF (NREAL.EQ.0) WRITE (6,106)                                   OUTPUT    58
                IF (NREAL.EQ.-1) WRITE (6,127)                                  OUTPUT    59
                DO 10 J=3,NT2                                                   OUTPUT    60
                T=XI(J)                                                         OUTPUT    61
                R=T*(ROB(K)-RB(K))+RB(K)                                        OUTPUT    62
80              I=I+1                                                           OUTPUT    63
                XX(I)=R*SIN(PHIP(K))                                            OUTPUT    64
                YY(I)=-R*COS(PHIP(K))                                           OUTPUT    65
                ZZ(I)=RHO(J,K)                                                  OUTPUT    66
                IF (NREAL.EQ.-1) GO TO 20                                       OUTPUT    67
85              GOO=GAM(1)*P(J,K)/RHO(J,K)                                      OUTPUT    68
                IF(GOO) 8,8,13                                                  OUTPUT    69
          8     CONTINUE                                                        OUTPUT    70
                GOO=-GOO                                                        OUTPUT    71
                WRITE(6,113)                                                    OUTPUT    72
90        13    CONTINUE                                                        OUTPUT    73
                SPSND=SQRT(GOO)                                                 OUTPUT    74
                ENTRO=ALOG(ABS(P(J,K)/RHO(J,K)**GAMMA))                         OUTPUT    75
                QSQ=U(J,K)**2+V(J,K)**2+W(J,K)**2                               OUTPUT    76
                ENTH=1.0-QSQ                                                    OUTPUT    77
95              WRITE(6,107) J,R,P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),ENTRO,SPSND,  OUTPUT  78
               *T,ENTH                                                          OUTPUT    79
                GO TO 21                                                        OUTPUT    80
          20    IF (NAPOUT.EQ.1) GO TO 18                                       OUTPUT    81
                CALL PGAS(P(J,K),RHO(J,K),SPSND,ENTH,TEM,ENTRO,GASCON,WPGX,-1.4,2)  OUTPUT 82
100             ENTRO=ENTRO/GASCON                                              OUTPUT    83
                ENTH=ENTH/BODYTH                                                OUTPUT    84
                UMA=U(J,K)/SPSND                                                OUTPUT    85
                VMA=V(J,K)/SPSND                                                OUTPUT    86
                WMA=W(J,K)/SPSND                                                OUTPUT    87
105             COMP=P(J,K)/(GASCON*TEM *RHO(J,K))                              OUTPUT    88
                TEMP=TEM /1.8                                                   OUTPUT    89
                WRITE (6,125) J,R,P(J,K),RHO(J,K),TEMP,UMA,VMA,WMA,ENTRO,SPSND,T.  OUTPUT 90
               1ENTH,COMP                                                       OUTPUT    91
                GO TO 21                                                        OUTPUT    92
110       18    CONTINUE                                                        OUTPUT    93
                XP=P(J,K)/PSTAG                                                 OUTPUT    94
                XR=RHO(J,K)/RSTAG                                               OUTPUT    95
                XU=U(J,K)/VMAXH                                                 OUTPUT    96
                XV=V(J,K)/VMAXH                                                 OUTPUT    97
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                XW=W(J,K)/VMAXH                                                 OUTPUT     98
                WRITE (6,125) J,R,XP,XR,TEMP,XU,XV,XW,ENTRO,SPSND,T,ENTH        OUTPUT     99
           21   CONTINUE                                                        OUTPUT    100
           10   CONTINUE                                                        OUTPUT    101
            9   CONTINUE                                                        OUTPUT    102
C.....CALL JOE MULLENS PRINTER PLOT                                             OUTPUT    103
                KMAX=(NPHI-3)+1                                                 OUTPUT    104
                JMAX=(NT2-3)+1                                                  OUTPUT    105
                KJMAX=KMAX*JMAX                                                 OUTPUT    106
                CALL ARPLOT(ZZ,XX,YY,1,3,20,KJMAX,FCUT,50,50)                   OUTPUT    107
                GO TO 7                                                         OUTPUT    108
            3   CONTINUE                                                        OUTPUT    109
C                                                                               OUTPUT    110
C..STORE DATA ON TAPE FOR DATA REDUCTION PROGRAM                                OUTPUT    111
C                                                                               OUTPUT    112
                WRITE(9) Z,NT2,NPHI2,RK,RJ,PHIFD,((P(J,K),RHO(J,K),U(J,K),V(J,K),W OUTPUT    113
               *(J,K),J=1                                                       OUTPUT    114
               *,NT2),RB(K),RBZ(K),RBPH(K),RS(K),RSZ(K),RSPHI(K),K=1,NPHI2)     OUTPUT    115
                GO TO 7                                                         OUTPUT    116
            4   CONTINUE                                                        OUTPUT    117
C                                                                               OUTPUT    118
C..STORE DATA ON DISK 1 OR 2                                                    OUTPUT    119
C                                                                               OUTPUT    120
                REWIND 12                                                       OUTPUT    121
                WRITE(12) XMACH,ALPHA,GAMMA,NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASC OUTPUT    122
               *ON,RK,PHIFD,RJ                                                  OUTPUT    123
                WRITE(12) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI ),J=3, OUTPUT    124
               *NT2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                           OUTPUT    125
                END FILE 12                                                     OUTPUT    126
                REWIND 12                                                       OUTPUT    127
                WRITE(6,112)                                                    OUTPUT    128
                GO TO 7                                                         OUTPUT    129
           14   CONTINUE                                                        OUTPUT    130
                REWIND 11                                                       OUTPUT    131
                WRITE(11) XMACH,ALPHA,GAMMA,NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASC OUTPUT    132
               *ON,RK,PHIFD,RJ                                                  OUTPUT    133
                WRITE(11) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI ),J=3, OUTPUT    134
               *NT2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                           OUTPUT    135
                END FILE 11                                                     OUTPUT    136
                REWIND 11                                                       OUTPUT    137
                WRITE(6,114)                                                    OUTPUT    138
                GO TO 7                                                         OUTPUT    139
C                                                                               OUTPUT    140
C..STORE DATA ON PUNCHED CARDS FOR RESTART CAPABILITY                           OUTPUT    141
C                                                                               OUTPUT    142
           15   CONTINUE                                                        OUTPUT    143
                CARDNO=0                                                        OUTPUT    144
                CARDNO=CARDNO+1                                                 OUTPUT    145
                WRITE (7,132) XMACH,ALPHA,GAMMA,RK,PHIFD,CARDNO                 OUTPUT    146
                WRITE(7,132) RJ                                                 OUTPUT    147
                CARDNO=CARDNO+1                                                 OUTPUT    148
                WRITE (7,122) NIT,NIPHI,NREAL,P1INF,R1INF,V1INF,GASCON,CARDNO   OUTPUT    149
                CARDNO=CARDNO+1                                                 OUTPUT    150
                WRITE(7,119) Z,CARDNO                                           OUTPUT    151
                DO 30 J=3,NT2                                                   OUTPUT    152
                DO 30 K=3,NPHI                                                  OUTPUT    153
                CARDNO=CARDNO+1                                                 OUTPUT    154
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```
      WRITE (7,120) P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),CARDNO          OUTPUT  155
30    CONTINUE                                                           OUTPUT  156
      DO 31 K=3,NPHI                                                     OUTPUT  157
175   CARDNO=CARDNO+1                                                    OUTPUT  158
      WRITE (7,121) RS(K),RSZ(K),RSPHI(K),CARDNO                         OUTPUT  159
31    CONTINUE                                                           OUTPUT  160
      END FILE 7                                                         OUTPUT  161
      REWIND 7                                                           OUTPUT  162
180   C                                                                  OUTPUT  163
      C                                                                  OUTPUT  164
      WRITE(6,118)                                                       OUTPUT  165
      GO TO 7                                                            OUTPUT  166
5     CONTINUE                                                           OUTPUT  167
185   C                                                                  OUTPUT  168
      C..OUTPUT SURFACE FLOW VARIABLES                                   OUTPUT  169
      C                                                                  OUTPUT  170
      XL=Z/ZEND                                                          OUTPUT  171
      WRITE(6,108) Z,XL,DZDT,ICONST(5)                                   OUTPUT  172
190   PRRT=1                                                             OUTPUT  173
      DO 11 K=3,NPHI                                                     OUTPUT  174
      PHI=PHIP(K)*RADI                                                   OUTPUT  175
      UMA=U(3,K)                                                         OUTPUT  176
      VMA=V(3,K)                                                         OUTPUT  177
195   WMA=W(3,K)                                                         OUTPUT  178
      IF (NREAL.NE.-1) GO TO 23                                          OUTPUT  179
      POPI=P(3,K)/P1INF                                                  OUTPUT  180
      CP=2.0/(GAMMA*XMACH**2)*(POPI-1.0)                                 OUTPUT  181
      RORI=RHO(3,K)/R1INF                                                OUTPUT  182
200   CALL RGAS(P(3,K),RHO(3,K),C,ENTH,TEM,ENTRO,GASCON,WRGX,-1,4,2)     OUTPUT  183
      RT=GASCON*TEM                                                      OUTPUT  184
      TEMRK=TEM/1.8                                                      OUTPUT  185
      PRRT=P(3,K)/(RHO(3,K)*RT)                                          OUTPUT  186
      HRT=ENTH/BODYM                                                     OUTPUT  187
205   GO TO 24                                                           OUTPUT  188
23    CONTINUE                                                           OUTPUT  189
      POPI=P(3,K)/PINF                                                   OUTPUT  190
      CP=2.0/(GAMMA*XMACH**2)*(POPI-1.0)                                 OUTPUT  191
      RORI=RHO(3,K)/RHOIN                                                OUTPUT  192
210   POVERR=P(3,K)/RHO(3,K)                                             OUTPUT  193
      QSQ=UMA**2+VMA**2+WMA**2                                           OUTPUT  194
      HRT=1.0-QSQ                                                        OUTPUT  195
      C=SQRT(GAM(1)*ABS(P/VERR))                                         OUTPUT  196
      ENTRO=ALOG(ABS(P(3,K))/RHO(3,K)**GAMMA)                            OUTPUT  197
215   IF (GASCON.NE.0.0) XMACH=POVERR/GASCON                             OUTPUT  198
24    CONTINUE                                                           OUTPUT  199
      UMA=UMA/C                                                          OUTPUT  200
      VMA=VMA/C                                                          OUTPUT  201
      WMA=WMA/C                                                          OUTPUT  202
220   WRITE (6,109) PHI,RB(K),CP,POPI,RORI,UMA,VMA,WMA,C,PRRT,HRT,TEMPK, OUTPUT  203
     1ENTRO                                                              OUTPUT  204
11    CONTINUE                                                           OUTPUT  205
      GO TO 7                                                            OUTPUT  206
6     CONTINUE                                                           OUTPUT  207
225   C                                                                  OUTPUT  208
      C..OUTPUT SHOCK LOCATION                                           OUTPUT  209
      C                                                                  OUTPUT  210
      WRITE(6,110) Z                                                     OUTPUT  211
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      DO 12 K=3,NPHI                                                    OUTPUT  212
230   PHI=PHIP(K)*RADI                                                  OUTPUT  213
      WRITE(6,111) PHI,RB(K),RBZ(K),RBPH(K),ROB(K),ROBZ(K),ROBPH(K)     OUTPUT  214
   12 CONTINUE                                                          OUTPUT  215
      GO TO 7                                                           OUTPUT  216
   19 CONTINUE                                                          OUTPUT  217
235   C                                                                 OUTPUT  218
      C..PUNCH DATA CARDS FOR 3-D S-O-S CODE                            OUTPUT  219
      C                                                                 OUTPUT  220
      READ(5,135) XMACHI,XLAMDD                                         OUTPUT  221
  135 FORMAT(2F10.5)                                                    OUTPUT  222
240   PIN=1.0                                                           OUTPUT  223
      RIN=1.0                                                           OUTPUT  224
      READ(11) XMACHD,ALPHAD,G,NIT,NIPHI,NR,P1,R1,Q1,GA,RK,PHIFD,RJ     OUTPUT  225
      AIN=SQRT(G)                                                       OUTPUT  226
      QIN=XMACHD*AIN                                                    OUTPUT  227
      READ(11) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI),      OUTPUT  228
245  * J=3,NT2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                        OUTPUT  229
      P3OP1=(2.0*G*XMACHI**2-(G-1.0))/(G+1.0)                           OUTPUT  230
      R3OR1=((G+1.0)*XMACHI**2)/(((G-1.0)*XMACHI**2+2.0)                OUTPUT  231
      A3OA1=SQRT(P3OP1/R3OR1)                                           OUTPUT  232
250   JC=NT2-2                                                          OUTPUT  233
      KM=NPHI-2                                                         OUTPUT  234
      DO 22 K=3,NPHI                                                    OUTPUT  235
      KK=K-2                                                            OUTPUT  236
      DO 25 J=3,NT2                                                     OUTPUT  237
255   JJ=J-2                                                            OUTPUT  238
      P(J,K)=P(J,K)/PINF*PIN                                            OUTPUT  239
      RHO(J,K)=RHO(J,K)/RHOIN*RIN                                       OUTPUT  240
      U(J,K)=U(J,K)/QINF*QIN                                            OUTPUT  241
      V(J,K)=V(J,K)/QINF*QIN                                            OUTPUT  242
260   W(J,K)=W(J,K)/QINF*QIN                                            OUTPUT  243
      EO(1,JJ,KK)=RHO(J,K)                                              OUTPUT  244
      EO(2,JJ,KK)=RHO(J,K)*U(J,K)                                       OUTPUT  245
      EO(3,JJ,KK)=RHO(J,K)*V(J,K)                                       OUTPUT  246
      EO(4,JJ,KK)=RHO(J,K)*W(J,K)                                       OUTPUT  247
265   25 FO(1,JJ,KK)=P(J,K)*GAM(4)+0.5*RHO(J,K)*(U(J,K)**2+V(J,K)**2+W(J,K)  OUTPUT  248
     *  **2)                                                           OUTPUT  249
      ROB(KK)=RS(K)                                                     OUTPUT  250
      ROBZ(KK)=RSZ(K)                                                   OUTPUT  251
      22 ROBPH(KK)=RSPHI(K)                                             OUTPUT  252
270   IF(NTOSOS.GT.1) GO TO 28                                          OUTPUT  253
      WRITE(7,133) ((((EO(II,JJ,KK),II=1,4),FO(1,JJ,KK),JJ=1,JC),KK=1,KM)  OUTPUT  254
      WRITE(7,134) (ROB(K),ROBZ(K),ROBPH(K),K=1,KM)                     OUTPUT  255
      GO TO 29                                                          OUTPUT  256
      28 WRITE(7) ((((EO(II,JJ,KK),II=1,4),FO(1,JJ,KK),JJ=1,JC),KK=1,KM),  OUTPUT  257
275  * (ROB(K),ROBZ(K),ROBPH(K),K=1,KM)                                 OUTPUT  258
      29 CONTINUE                                                       OUTPUT  259
      READ(12) XMACHN,ALPHAN,G,NIT,NIPHI,NP,P3,R3,Q3,GA,RK,PHIFD,RJ     OUTPUT  260
      READ(12) Z,((P(J,K),RHO(J,K),U(J,K),V(J,K),W(J,K),K=3,NPHI),      OUTPUT  261
     * J=3,NT2),(RS(K),RSZ(K),RSPHI(K),K=3,NPHI)                        OUTPUT  262
280   AA=1.0+GAM(1)*XMACHN**2                                           OUTPUT  263
      BB=AA-1.0                                                         OUTPUT  264
      PINF4=1.0/AA**GAM(3)                                              OUTPUT  265
      RINF4=1.0/AA**GAM(4)                                              OUTPUT  266
      QINF4=SQRT(BB/AA)                                                 OUTPUT  267
285   AINF4=SQRT(GAM(1)*(1.0-QINF4**2))                                 OUTPUT  268
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                      DO 26 K=3,NPHI                                                    OUTPUT  269
                      KK=K-2                                                            OUTPUT  270
                      DO 27 J=3,NTZ                                                     OUTPUT  271
                      JJ=J-2                                                            OUTPUT  272
  290                 P(J,K)=P(J,K)/PINF4*P3OP1*PIN                                     OUTPUT  273
                      RHO(J,K)=RHO(J,K)/RINF4*RR3OR1*RIN                                OUTPUT  274
                      U(J,K)=U(J,K)/AINF4*A33A1*AIN                                     OUTPUT  275
                      V(J,K)=V(J,K)/AINF4*A33A1*AIN                                     OUTPUT  276
                      W(J,K)=W(J,K)/AINF4*A33A1*AIN                                     OUTPUT  277
  295                 EO(1,JJ,KK)=RHO(J,K)                                              OUTPUT  278
                      EO(2,JJ,KK)=RHO(J,K)*U(J,K)                                       OUTPUT  279
                      EO(3,JJ,KK)=RHO(J,K)*V(J,K)                                       OUTPUT  280
                      EO(4,JJ,KK)=RHO(J,K)*W(J,K)                                       OUTPUT  281
                   27 FO(1,JJ,KK)=P(J,K)*GAM(4)+0.5*RHO(J,K)*(U(J,K)**2+V(J,K)**2+W(J,K) OUTPUT  282
  300               **2)                                                              OUTPUT  283
                      ROB(KK)=RS(K)                                                     OUTPUT  284
                      ROBZ(KK)=RSZ(K)                                                   OUTPUT  285
                   26 ROBPH(KK)=RSPHI(K)                                                OUTPUT  286
                      IF(NTUSOS.GT.1) GO TO 32                                          OUTPUT  287
  305                 WRITE(7,133) ((((EO(II,JJ,KK),II=1,4),FO(1,JJ,KK),JJ=1,JK),KK=1,KM) OUTPUT  288
                      WRITE(7,134) (ROB(K),ROBZ(K),ROBPH(K),K=1,KM)                     OUTPUT  289
                      GO TO 33                                                          OUTPUT  290
                   32 WRITE(7) ((((EO(II,JJ,KK),II=1,4),FO(1,JJ,KK),JJ=1,JK),KK=1,KM),  OUTPUT  291
                     * (ROB(K),ROBZ(K),ROBPH(K),K=1,KM)                                 OUTPUT  292
  310               33 CONTINUE                                                         OUTPUT  293
                      RN=RHO(3,NPHI)                                                    OUTPUT  294
                      PN=P(3,NPHI)                                                      OUTPUT  295
                      QN=SQRT(U(3,NPHI)**2+V(3,NPHI)**2)                                OUTPUT  296
                      AN=SQRT(GAM(4)*PN/RN)                                             OUTPUT  297
  315                 ZSTAT=(QN-AN)*COS(SIGM)                                           OUTPUT  298
                      XLAMD=XLAMDD/RADI                                                 OUTPUT  299
                      ZMIN1=ZSTAT*(1.0-TAN(SIGM)*TAN(XLAMD))                            OUTPUT  300
                      QI=XMACHI*SQRT(GAM(4))                                            OUTPUT  301
                      ALPH=ALPHAD/RADI                                                  OUTPUT  302
  320                 SALF=SIN(ALPH)                                                    OUTPUT  303
                      CALF=COS(ALPH)                                                    OUTPUT  304
                      SLAM=SIN(XLAMD)                                                   OUTPUT  305
                      CLAM=COS(XLAMD)                                                   OUTPUT  306
                      QII=XMACHI*SQRT(GAM(4))                                           OUTPUT  307
  325                 UIS=QII*CALF-QII*SLAM                                             OUTPUT  308
                      WIS=QII*CALF+QII*CLAM                                             OUTPUT  309
                      QIS=-SQRT(UIS**2+WIS**2)                                          OUTPUT  310
                      XKAPPA=ATAN2(UIS,WIS)                                             OUTPUT  311
                      ZIS=QII*COS(XKAPPA)/CLAM                                          OUTPUT  312
  330                 WRITE(6,129) XMACHI,XLAMDD,ZMIN1,ZIS                              OUTPUT  313
                  129 FORMAT(* STARTING SOLUTION GENERATED FOR 3-D S-D-S CODE*/* MACHI=* OUTPUT  314
                     * ,F6.2/* LAMBDA=*,F6.2/* ZMIN=*,F6.2/* ZIS=*,F6.2)               OUTPUT  315
                  133 FORMAT(5E15.7)                                                    OUTPUT  316
                  134 FORMAT(6E13.6)                                                    OUTPUT  317
  335             C   CONTINUE                                                          OUTPUT  318
                  100 FORMAT(1H1,5X,7HMACH = ,F9.6/6X,8HALPHA = ,F5.6/6X,8HGAMMA = ,F5.3 OUTPUT  319
                     */6X,8HSIGMA = ,F5.2)                                              OUTPUT  320
                  101 FORMAT(1HO,5X 12HZ-INITIAL = ,F7.2/6X,10HZ-FINAL = ,F9.2/6X,11HPHI OUTPUT  321
                     *-ZERO = ,F6.2)                                                    OUTPUT  322
  340             102 FORMAT(1HO,5X,6HNIT = ,I2/6X,8HNIPHI = ,I2/6X,15HMULTIGRID ORDER = ,I OUTPUT  323
                     *1                                                                 OUTPUT  324
                     */6X,8HNITER = ,I4/6X,8HGPRNT = ,I1/6X,8HIPRNT = ,I1/6X,8HNCONL = , OUTPUT  325
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     *I1,/6X,7HGWRPRT=,I2,/6X,7HWREAL = ,I2)                                  OUTPUT  326
  103 FORMAT(1HO,5X,8HDZ/DT = ,F6.3,10H INITIALLY /6X,10HDELTA-X =  F6.3      OUTPUT  327
345   *//6X,                                                                  OUTPUT  328
     *10HDELTA-Y = ,F6.3)                                                     OUTPUT  329
  104 FORMAT(1HO,5X,9HDISK1 = ,I1/6X,8HDISK2 = ,I1/6X,8HTAPE1 = ,I1/         OUTPUT  330
     *6X,8HTAPE2 = ,I1)                                                       OUTPUT  331
  105 FORMAT(1HO,48X,2HK=,I2,3X,6H PHI =,F5.1,3X,4HZ = ,F10.6)                OUTPUT  332
350 106 FORMAT(1HO,1X,1HJ,3X,1CH     R      , 8X,1HP,11X,3HRHO,11X,1HU,12X,1  OUTPUT  333
     *HV,12X,1HW,6X,11H(S-SINF)/CV, 8X,1HA,6X,5H - T   ,7X,4HM/HT ,/)         OUTPUT  334
  107 FORMAT(1X,I3,0PF13.8,2(1PE13.5),5(0PF13.8),0PF8.4,2X,0PF7.4)            OUTPUT  335
  108 FORMAT(1HO,15X,29HSURFACE FLOW VARIABLES AT Z =,F10.6/10X,6HX/L =       OUTPUT  336
     *F                                                                       OUTPUT  337
355   *10.6,5X,5HDZDT=,F10.6,5X,5HITER=,I5//3X,3HPHI,4X,                      OUTPUT  338
     *2HRB,7X,2HCP,7X,6HP/PINF,7X,6HM/RINF,7X,3HM-Z,7X,3HM-R,6X,5HM-PHI,      OUTPUT  339
     *9X,1HA,8X,4HCOMP ,4X,4HM/HT,5X,4HTEMP,4X,12H(S-S.INF)/CV/)              OUTPUT  340
  109 FORMAT(1H ,0PF5.1,1X,0PF9.4,1X,0PF7.4,1X,1PE11.4,2X,1PE11.4,2X,        OUTPUT  341
     *0PF8.4,2X,0PF8.4,2X,0PF8.4 ,2X,1PE11.4,1X,0PF7.4,1X,0PF8.5,1X,         OUTPUT  342
360   *0PF9.2,1X,1PE11.4)                                                     OUTPUT  343
  110 FORMAT(1HO,10X,30HBODY AND SHOCK GEOMETRY AT Z = ,F6.3,//6X,3HPHI,      OUTPUT  344
     *9X                                                                      OUTPUT  345
     *,2HRB,8X,6HDRB/DZ,5X,8HDRB/DPHI,7X,2HRS,8X,6HDRS/DZ,5X,8HDRS/DPHI)      OUTPUT  346
  111 FORMAT(1H ,4X,F5.1,3X,F9.4,5X,F7.4,3X,F9.4,4X,F9.4,4X,F7.4,3X,F9.4     OUTPUT  347
365   *)                                                                      OUTPUT  348
  112 FORMAT(1HO,34HFLOW FIELD DATA IS STORED ON DISK1)                       OUTPUT  349
  113 FORMAT(1H ,38HERROR CHECK - SPEED OF SOUND IN OUTPUT)                   OUTPUT  350
  114 FORMAT(1HO,34HFLOW FIELD DATA IS STORED ON DISK2)                       OUTPUT  351
  115 FORMAT(1HO,5X,27HPERCENT OF MAX. STEPSIZE = ,F4.2/6X,8HMETHOD = ,I      OUTPUT  352
370   *2                                                                      OUTPUT  353
     *//6X,12HBND. COND. = ,I2/6X,5HBETA=,F5.2/6X,6HOMEGA=,F6.3)              OUTPUT  354
  116 FORMAT(1HO,5X,7HPINF = ,E15.6,5X,8HRHOIN = ,E15.6,5X,7HQINF = ,         OUTPUT  355
     *E15.6)                                                                  OUTPUT  356
  117 FORMAT(1H ,5X,4HK = ,I2,5X,4HPHI=,F10.6,5X,5HUINF=,F10.6,5X,5HVINF=     OUTPUT  357
375   *,F10.6,5X,5HWINF=,F10.6)                                               OUTPUT  358
  118 FORMAT(1HO,31HDATA IS STORED ON PUNCHED CARDS)                          OUTPUT  359
  119 FORMAT(1PE15.6,61X,I4)                                                  OUTPUT  360
  120 FORMAT(5(1PE15.6),1X,I4)                                                OUTPUT  361
  121 FORMAT(3(1PE15.6),31X,I4)                                               OUTPUT  362
380 122 FORMAT(3I5,4(1PE15.6),1X,I4)                                          OUTPUT  363
  123 FORMAT(1HO,12HV(LBS/SQFT)=,1PE13.6,1X,16HRHO(SLUGS/CUFT)=,1PE13.6,      OUTPUT  364
     *1X,                                                                     OUTPUT  365
     *14HV1INF(FT/SEC)=1PE13.6,1X,6HBODYM=,1PE11.4,1X,6HBODYS=,              OUTPUT  366
     *2(PE11.4)                                                               OUTPUT  367
385  124 FORMAT(1H ,5X,4HK = ,I2,5X,4HPHI=,F10.6,5X,5HUINF=,E13.6,5X,5HVINF   OUTPUT  368
     *=,E13.6,5X,5HWINF=,E13.6)                                               OUTPUT  369
  125 FORMAT(1H ,I3,1X,0PF9.5,1X,1PE12.5,1X,1PE12.5,1X,0PF9.2,1X,0PF9.5,     OUTPUT  370
     *1X,0PF9.5,1X,0PF9.5,1X,0PF9.4,1X,1PE12.5,1X,0PF8.4,1X,0PF8.5,1X,       OUTPUT  371
     *0PF7.4)                                                                 OUTPUT  372
390 126 FORMAT(1HO,5X,40HFREE STREAM NORMALIZATION CONSTANTS - P=,1PE12.5,    OUTPUT  373
     *11X,2HR=,1PE12.5,1X,7HVMAX.A=,1PE12.5,1X,2HH=,1PE12.5,1X,2HS=,         OUTPUT  374
     *2(PE12.5)                                                               OUTPUT  375
  127 FORMAT(1HO,1X,1HJ,5X,1HR,10X,1HP,12X,3HPHO,8X,4HTEMP,5X,6HU-MACH,      OUTPUT  376
     *4X,6HV-MACH,6X,6HW-MACH,5X,3HS/R,10X,1HA,9X,1HT,8X,4HM/HT,5X,          OUTPUT  377
395  *8HMCOMP)                                                                OUTPUT  378
  128 FORMAT(1HO,5X,7HGASCON=,1PE11.4 /1H )                                   OUTPUT  379
  131 FORMAT(1H ,18HDATA STORED FOR Z=, 1PE15.7)                              OUTPUT  380
  132 FORMAT(5(1PE15.6),1X,I4)                                                OUTPUT  381
      RETURN                                                                  OUTPUT  382
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400                 END                                    OUTPUT   383
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      FUNCTION PGHS(H,S,M)                                                  PGHS       2
C     PROG. COMPUTES PRESSURE THAT CORRESPONDS TO A GIVEN ENERGY AND        PGHS       3
C     ENTROPY.                                                              PGHS       4
      EXTERNAL PROOT                                                        PGHS       5
      REAL M                                                                PGHS       6
      COMMON/REALG/NREAL,NWRPRT,BODYH,BODYS,PSONIC,RSONIC,PIINF,RIINF       REALG      2
     *,VIINF,NITFAG,NUMOUT                                                  REALG      3
      COMMON/JOIN1/HP,SP,GMACH,NEW                                          JOIN1      2
      COMMON/CONRG/PO,RO,TO,CONC,GASCON,HC,SO,AO,RTO,GX                     CONRG1     2
      LOGICAL BOL,TRN                                                       PGHS      10
      HP=H                                                                  PGHS      11
      SP=S                                                                  PGHS      12
      GMACH=M                                                               PGHS      13
      TRN=.FALSE.                                                           PGHS      14
      PH=(1.0E+3)*PO                                                        PGHS      15
      PL=(5.0E-6)*PO                                                        PGHS      16
   99 CONTINUE                                                              PGHS      17
      NEW=1                                                                 PGHS      18
      CALL ZEROIN(PL,PH,1.0E-6,PROOT ,BOL,,XX,YY)                           PGHS      19
      PGHS=(XX+YY)/2.0                                                      PGHS      20
      IF (BOL) GO TO 101                                                    PGHS      21
      CALL RGAS(PGHS,RX,AX,HX,TX,SP,GASCON,GX,-1,5,2)                       PGHS      22
      HX=H/(GASCON*TX)                                                      PGHS      23
      SX=S/GASCON                                                           PGHS      24
      RX=PX/PO                                                              PGHS      25
      WRITE (6,100) HX,SX,PL,PH,M,PGHS,RX                                   PGHS      26
  100 FORMAT(1HO,18HNONCON.PGHS. H/RT=          ,1PE11.4,1X,4HS/R=,1PE11.4  PGHS      27
     *,                                                                     PGHS      28
     11X,5HPL=,1PE11.4,1X,5HPH=,1PE11.4,1X,2HM=    ,0PF7.3,1X,5HPGHS=,      PGHS      29
     21PE11.4,1X,5HR/RO=,1PE11.4)                                           PGHS      30
      IF (TRN) RETURN                                                       PGHS      31
      TRN=.TRUE.                                                            PGHS      32
      PH=(3.5E+3)*PO                                                        PGHS      33
      GO TO 99                                                              PGHS      34
  101 CONTINUE                                                              PGHS      35
      IF (NWRPRT.GE.2) GO TO 102                                            PGHS      36
      RETURN                                                                PGHS      37
  102 CONTINUE                                                              PGHS      38
      CALL RGAS(PGHS,RX,AX,HX,TX,SP,GASCON,GX,-1,5,2)                       PGHS      39
      HX=H/(GASCON*TX)                                                      PGHS      40
      SX=S/GASCON                                                           PGHS      41
      PX=PGHS/PO                                                            PGHS      42
      WRITE (6,103) H,S,M,PGHS,HX,SX,PX,TX                                  PGHS      43
  103 FORMAT(1H ,10HPGHS-  H=,1PE11.4,1X,2HS=1PE11.4,1X,2HM=0PF7.3,1X,      PGHS      44
     13HPS=1PE11.4,1X,5HH/RT=,1PE11.4,1X,4HS/R=1PE11.4,1X,5HP/PO=1PE11.4    PGHS      45
     2,1X,2HT=,1PE11.4)                                                     PGHS      46
      RETURN                                                                PGHS      47
      END                                                                   PGHS      48
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SUBROUTINE PMANG      76/76  OPT=1                    FTN 4.6+440     06/15/79 10.58.36      PAGE    1

 1                    SUBROUTINE PMANG(ANG,P1,P2,R2,LR)                                      PMANG     2
                C     REINHART (10-6-71) --BY USE OF PRANDTL-MEYER FORMULA AND STATE         PMANG     3
                C     RELATION AND GIVEN FLOW PROP AND TURNING ANGLE PROGRAM COMPUTES        PMANG     4
                C     DOWN-STREAM FLOW PROP.                                                 PMANG     5
 5                    REAL MSTACH                                                            PMANG     6
                      LOGICAL BTK                                                            PMANG     7
                      COMMON/CONRL/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX                      COMRG1    2
                      COMMON/FLG/MPERF,NUMPRT,    M,    S,PSONIC,RSONIC,PIINF,RIINF      PERLG1    2
                     *,WINF,NITAPS,NUMPLT                                                    PERLG1    3
10                    DIMENSION PMRA(20),NER(2)                                              PMANG    10
                      DIMENSION PTAB(250),PMTAB(250)                                         PMANG    11
                      DATA PMTA(1),EPSILON/2/,NRES,NMANG /                                   PMANG    12
                      DATA RADCON/57.2957B/                                                  PMANG    13
                      DATA HTOT,STOT/1.,1./                                                  PMANG    14
15                    DATA PMMIN/1.0/                                                        PMANG    15
                      DATA NUMTAB/250/                                                       PMANG    16
                      DATA I125/0/                                                           PMANG    17
                      DATA RRPRE/0./                                                         PMANG    18
                      IF (I125.NE.123) GO TO 87                                              PMANG    19
20                    IF (M.NE.HTOT.OR.S.NE.STOT) GO TO 87                                   PMANG    20
                      IF (ANG.EQ.0.0) GO TO 88                                               PMANG    21
                      GO TO 100                                                              PMANG    22
                87    I1.3=123                                                               PMANG    23
                      RRR=GASCON                                                             PMANG    24
25                    STOT=S                                                                 PMANG    25
                      HTOT=M                                                                 PMANG    26
                      IF (NUMPRT.GE.1) WRITE (6,106) ANG,M,S                                 PMANG    27
                106   FORMAT(1HO,15HPRAND ANGLE=,1PE12.5,1X,7HMBODY-M=,1PE12.8,1X,7HMBODY    PMANG    28
                     *-S=,                                                                   PMANG    29
30                   1PE12.5)                                                                PMANG    30
                90    PRO=PSMS(M,S,1.0)                                                      PMANG    31
                      PLNPRE=ALOG(PRO)                                                       PMANG    32
                      PTAB(1)=PLNPRE                                                         PMANG    33
                      PLNPRE=PLNPRE                                                          PMANG    34
35                    PMTAB(1)=0.0                                                           PMANG    35
                      SUM=0.0                                                                PMANG    36
                      CALL RGAS(PRO,RX,RO,HX,TX,STOT,RRR,GX,-1,S,2)                          PMANG    37
                      IF (NUMPRT.GE.1) WRITE (6,107) PRO,RX,RO,HX,TX,STOT                    PMANG    38
                107   FORMAT(1H ,10HPRAND PS=,1PE11.4,1X,3HRS=1PE11.4,1X,3HAS=1PE11.4,1      PMANG    39
40                   RX,                                                                     PMANG    40
                     23HHS=1PE11.4,1X,3HTS=1PE11.4,1X,3HCS=1PE11.4)                          PMANG    41
                      GAMES=ARRAY(PRO                                                        PMANG    42
                      GG=1.0/(GAMES-1.0)                                                     PMANG    43
                      PSONIC=PRO                                                             PMANG    44
45                    RSONIC=RX                                                              PMANG    45
                      RPRE=HTOT-HX                                                           PMANG    46
                      RO=RPRE                                                                PMANG    47
                      AO=RX                                                                  PMANG    48
                      HXO=HX                                                                 PMANG    49
50                    DELP=0.05                                                              PMANG    50
                      GPPL=0.0                                                               PMANG    51
                      NT=0                                                                   PMANG    52
                      PLNPRE=PLNPRE+DELP                                                     PMANG    53
                91    PLNPRE=PLNPRE-DELP                                                     PMANG    54
55                    IF (NT.GE.NUMTAB) GO TO 96                                             PMANG    55
                      PRR=EXP(PLNPRE)                                                        PMANG    56
                      CALL RGAS(PRR,RX,RX,HX,TX,STOT,RRR,GX,-1,S,2)                          PMANG    57
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                      AMACH=SQRT(ABS((HTOT-HX)*2.0))/RX                                 PMAG    58
                      F=HTOT-HX                                                         PMAG    59
   60                 TWOF=2.0*F                                                        PMAG    60
                      SQMACH=TWOF/(RX*RX)                                               PMAG    61
                      G=SQRT(ABS(SQMACH-1.0))/TWOF                                      PMAG    62
                      TERMS=(LG+LPRE)*(F-FPRE)*0.5                                      PMAG    63
                      SUM=TERMS+SUM                                                     PMAG    64
   65                 NT=NT+1                                                           PMAG    65
                      PTAB(NT)=PLNPPE                                                   PMAG    66
                      PMTAB(NT)=SUM                                                     PMAG    67
                      IF (NWPRT.NE.2) GO TO 151                                         PMAG    68
                      TC=TX/1.8                                                         PMAG    69
   70                 PMTABD=PMTAB*RADDEG                                               PMAG    70
                      PMTABS=SUMPRADDEG                                                 PMAG    71
                      WRITE (6,150) NT,PX,RX,AX,HX,TC,AMACH,F,G,PMTABD,PMTABS           PMAG    72
                150   FORMAT(1H ,I3,1X,2HP=,1PE13.6,1X,2HR=,1PE10.3,1X,2HA=,1PE10.3,1X, PMAG    73
                     1 2HH=,1PE10.3,1X,2HT=,0PF8.2,1X,2HM=,0PF7.3,1X,2HF=,1PE11.4,1X,2HG= PMAG    74
   75               2,1PE11.4,1X,2HD=,0PF8.5,1X,3HDG=,0PF9.4)                         PMAG    75
                151   CONTINUE                                                          PMAG    76
                      FPRE=F                                                            PMAG    77
                      GPRE=G                                                            PMAG    78
                      IF (RX.EQ.RXPRE) GO TO 96                                         PMAG    79
   80                 IF (SUMPRADDEG.GT.3*0.0) GO TO 96                                 PMAG    80
                      IF (AMACH.GE.MXMACH) GO TO 96                                     PMAG    81
                      RXPRE=RX                                                          PMAG    82
                      GO TO 91                                                          PMAG    83
                C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -   PMAG    84
   85           96    CONTINUE                                                          PMAG    85
                      IF (NWPRT.EQ.0) GO TO 97                                          PMAG    86
                      MXMACH=AMACH                                                      PMAG    87
                      HRAT=H/RTO                                                        PMAG    88
                      SRAT=S/GASCON                                                     PMAG    89
   90                 WRITE (6,92) HRAT,SRAT,GAMEQ,GAM1,PO,RO,TO,RRX                    PMAG    90
                92    FORMAT(1H1,31H---PRANDTL-MEYER TURNING ANG-- ,8HTOTENTH=,1PE15.7,1 PMAG    91
                     1X                                                                 PMAG    92
                     1,8HENTROPY=,1PE15.7,1X,10H(GAMMA)EQ=,1PE15.7,1X,5HCP/R=,1PE15.7   PMAG    93
                     2/1H ,3HPO=,1PE13.6,1X,3HRO=,1PE13.6,1X,3HTO=,1PE13.6,1X,8HGAS-CON= PMAG    94
   95               3,1PE13.6 /1HO,9X,4HP/PO,9X,6HM-RRX,,7X,5HENTHP,,8X,4HMACH,,9X,    PMAG    95
                     4HH/HO/RO,7X,5HH/RTO,,8X,7HTEMP(K),6X,5HSOUND,8X,5HENTRO)          PMAG    96
                93    DO 95 N1=1,NT                                                     PMAG    97
                      P=EXP(PTAB(N1))                                                   PMAG    98
                      CALL PGAS(P,RX,RX,HX,TX,STOT,RRX,GX,-1.5,2)                       PMAG    99
  100                 AMACH=SQRT(ABS((HTOT-HX)*2.0))/RX                                 PMAG   100
                      PRAT=P/PO                                                         PMAG   101
                      PMTABD=PMTAB(N1)*RADDEG                                           PMAG   102
                      RRAT=RX/RO                                                        PMAG   103
                      HRAT=HX/RTO                                                       PMAG   104
  105                 TC=TX/1.8                                                         PMAG   105
                      CALL PGAS(P,RX,AX,HX,TX,ENTRO,RRX,GX,-1.4,2)                      PMAG   106
                      IF (N1.NE.NT) DPDLP=(PMTAB(N1+1)-PMTAB(N1))/(PTAB(N1+1)-PTAB(N1)) PMAG   107
                      WRITE(6,94) N1,PRAT,PMTABD,DPDLP,AMACH,RRAT,HRAT,TC,RX,ENTRO      PMAG   108
                94    FORMAT(1H ,I3,1X,9(1PE13.6))                                      PMAG   109
  110           95    CONTINUE                                                          PMAG   110
                97    CONTINUE                                                          PMAG   111
                      IF (PNG.NE.0.0) GO TO 100                                         PMAG   112
                98    P2=P1                                                             PMAG   113
                      GO TO 101                                                         PMAG   114
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  100 CONTINUE
      IF (P1.GT.PSONIC) GO TO 104
      ALNP1=ALOG(P1)
      JMP=1
      CALL SERCH(ALNP1,PTAB,1,NT,1,NZ,NER(1))
      IF (NER(1).NE.0) GO TO 102
      ALNP0=PTAB(NZ)
      ALNP2=PTAB(NZ+1)
      ANG0=PMTAB(NZ)
      ANG2=PMTAB(NZ+1)
      DER1=(ALNP1-ALNP0)/(ALNP2-ALNP0)
      ANGZ=ANG0+(ANG2-ANG0)*DER1
      ANG1=ANG+ANGZ
      JMP=2
      CALL SERCH(ANG1,PMTAB,1,NT,1,NY,NER(2))
      IF (NER(2).NE.0) GO TO 102
      ANG0=PMTAB(NY)
      ANG2=PMTAB(NY+1)
      BLNP0=PTAB(NY)
      BLNP2=PTAB(NY+1)
      DER2=(ANG1-ANG0)/(ANG2-ANG0)
      ALNPY2=BLNP0+(BLNP2-BLNP0)*DER2
      P2=EXP(ALNPY2)
  101 CALL RGAS(P2,R2,A2,H2,T2,STOT,ARX,GX,-1,5,2)
      U2=SQRT(ABS((HTOT-H2)*2.0))
      WRMACH=U2/A2
      IF (NAPRT.LE.1) RETURN
      WRITE (6,110) DER1,ALNP0,ALNP1,ALNP2,ANG0,ANGZ,ANG2,DER2,ANG0,ANG1
     1,ANG2,BLNP0,ALNPY2,BLNP2,P2,R2,A2,H2,T2,STOT,WRMACH
  110 FORMAT(1H ,12HPPHANG- F-P=,0PF7.4,2X,4HLNP=3(1PE11.4,1X),2X,3HANG=
     13(1PE11.4,1X)/1H ,8X,4HF-A=0PF7.4,2X,4HANG=3(1PE11.4,1X),2X,4HLNP=
     23(1PE11.4,1X) /1H ,8X,2HP=1PE11.4,1X,2HR=1PE11.4,1X,2HA=1PE11.4,
     31X,2HH=1PE11.4,1X,2HT=1PE11.4,1X,2HS=1PE11.4,1X,2HM=1PE11.4)
      RETURN
  102 CONTINUE
      WRITE (6,103) ERROR(JMP),NER(JMP),PTAB(1),P1,PTAB(NT),PMTAB(1),
     1ANG1,PMTAB(NT)
  103 FORMAT(1H ,34HERROR IN SERCH FROM PHANG ROUTINE ,2X,A4,2X,I3,2X,
     125HRETURNED WITH P2=P1, ETC./1H ,5HP(1)=1PE13.6,1X,2HP=1PE13.6,1X,
     25HP(N)=1PE13.6,5X,5HA(1)=1PE13.6,1X,2HA=1PE13.6,1X,5HA(N)=1PE13.6)
      GO TO 88
  104 CONTINUE
      WRITE (6,105) P1,PSONIC
  105 FORMAT(1H ,42HENTRY PRES TO PHANG ROUTINE TOO LARGE. P1=,1PE13.6,1
     *X,
     129HIS GREATER THAN SONIC P(H,S)=,1PE13.6,1X,24HRETURNED WITH P2=P1
     *,ETC.)
      GO TO 88
      END
```

```
      C     POLY                                                      POLY      2
            FUNCTION POLY(X,M,C,RO)                                   POLY      3
            DIMENSION C(20)                                           POLY      4
            K=M-1                                                     POLY      5
            SUM=C(M)                                                  POLY      6
            DO 2 I=1,K                                                POLY      7
            II=M-I                                                    POLY      8
            SUM=SUM*(X-RO)+C(II)                                      POLY      9
      2     CONTINUE                                                  POLY     10
            POLY=SUM                                                  POLY     11
            RETURN                                                    POLY     12
            END                                                       POLY     13
```

```
   FUNCTION PROOT      76/76   OPT=1                FTN 4.6+460      06/15/79  18.58.36      PAGE     1

 1                FUNCTION PROOT(PX)                                                PROOT      2
                  COMMON/REALG/NPEAL,NWRPRT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF   REALG      2
                 *,V1INF,NITAVG,NWROUT                                              REALG      3
                  COMMON/CONRG/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX                 CONRG1     2
 5                COMMON/JOIN1/HP,SP,GMACH,NEW                                      JOIN1      2
                  DATA I123/0/                                                      PROOT      6
                  DATA NEWP/0/                                                      PROOT      7
                  IF (NEWP.NE.NEW) NT=0                                             PROOT      8
                  NEW=0                                                             PROOT      9
10                NT=NT+1                                                           PROOT     10
                  IF (I123.EQ.123) GO TO 99                                         PROOT     11
                  NEWP=NEW                                                          PROOT     12
                  I123=123                                                          PROOT     13
                  NT=1                                                              PROOT     14
15                RRX=GASCON                                                        PROOT     15
            99    CONTINUE                                                          PROOT     16
                  CALL RGAS(PX,RX,AX,HX,TX,SP,RRX,GX,-1,S,2)                        PROOT     17
                  IF (GMACH.EQ.0.0) GO TO 100                                       PROOT     18
                  VEL=AX*GMACH                                                      PROOT     19
20                ENG=VEL*VEL*0.5                                                   PROOT     20
                  PROOT=(HP-HX)/ENG-1.0                                             PROOT     21
                  IF (NWRPRT.GE.2) GO TO 102                                        PROOT     22
                  RETURN                                                            PROOT     23
            100   IF (HP.EQ.0.0) GO TO 101                                          PROOT     24
25                PROOT=(HP-HX)/HP                                                  PROOT     25
                  IF (NWRPRT.GE.2) GO TO 102                                        PROOT     26
                  RETURN                                                            PROOT     27
            101   PROOT=HX                                                          PROOT     28
                  IF (NWRPRT.GE.2) GO TO 102                                        PROOT     29
30                RETURN                                                            PROOT     30
            102   CONTINUE                                                          PROOT     31
                  TX=TX/1.8                                                         PROOT     32
                  PRAT=PX/PO                                                        PROOT     33
                  RRAT=RX/RO                                                        PROOT     34
35                WRITE (6,103) NT,PX,PRAT,VEL,HP,HX,PROOT,PRAT,SP                  PROOT     35
            103   FORMAT(1H ,7H*PROOT-,I2,1X,2HT=,1PE11.4,1X,5HP/PO=,1PE11.4,1X,    PROOT     36
                 12HV=,1PE11.4,1X,3HHP=,1PE11.4,1X,2HH=,1PE11.4,1X,2HF=,1PE11.4,1X, PROOT     37
                 25HR/RO=,1PE11.4,1X,2HS=,1PE11.4)                                  PROOT     38
                  RETURN                                                            PROOT     39
40                END                                                               PROOT     40
```

```
                      FUNCTION PROOT1(U)                                        PROOT1     2
                      COMMON/REALG/NREAL,NWRPRT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF   REALG     2
                     *,V1INF,NITAVG,NWROUT                                      REALG     3
                      COMMON/WRDK00/AWR,BWR,CWR,DWR,UWR,VWR,WWR,PWR,RHOWR,WRC1,NEWR,NTAL WRDK00    2
                      COMMON/WRDK02/AX,HX,TX,SX                                 WRDK02    2
                      COMMON/CONRG/WRPO,WRRD,WRTO,WRCON,GASCON,WRHO,WRSO,WRAD,WRRTO,WRGX CONRG    2
                      UWR=U                                                     PROOT1     7
                      PWR=BWR-AWR*UWR                                           PROOT1     8
                      IF (PWR.LE.0.0) GO TO 102                                 PROOT1     9
                      RHOWR=AWR/UWR                                             PROOT1    10
                      NUMX=-2                                                   PROOT1    11
                      IF (NTAL.GT.400) NUMX=2                                   PROOT1    12
                      CALL RGAS(PWR,RHOWR,AX,HX,TX,SX,GASCON,WRGX,-1,NUMX,2)    PROOT1    13
                   99 PROOT1=WRC1-HX-UWR*UWR*0.5                                PROOT1    14
                      NTAL=NTAL+100                                             PROOT1    15
                      IF (NEWR.NE.1) GO TO 103                                  PROOT1    16
                      AX=0.0                                                    PROOT1    17
                      NTAL=100                                                  PROOT1    18
                      NEWR=0                                                    PROOT1    19
                  103 CONTINUE                                                  PROOT1    20
                      IF (NEWR.EQ.2) GO TO 100                                  PROOT1    21
                      IF (NWRPRT.EQ.0) RETURN                                   PROOT1    22
                      IF (NWRPRT.NE.4) RETURN                                   PROOT1    23
                      USQ=U*U*.5                                                PROOT1    24
                      ENTHC=WRC1-USQ                                            PROOT1    25
                      CALL RGAS(PWR,RHOWR,AX,HX,TX,SX,GASCON,WRGX,-1,4,2)       PROOT1    26
                      NTXX=NTAL/100                                             PROOT1    27
                      PZ=PWR/WRPO                                               PROOT1    28
                      RHOZ=RHOWR/WRRD                                           PROOT1    29
                      HZ=HX/(TX*GASCON)                                         PROOT1    30
                      SZ=SX/GASCON                                              PROOT1    31
                      TZ=TX/1.8                                                 PROOT1    32
                      IF(AWR.NE.0.0) UHI=BWR/AWR                                PROOT1    33
                      IF (UHI.NE.0.0) FFF=U/UHI                                 PROOT1    34
                      WRITE (6,101) NTXX,PWR,RHOWR,U,WRC1,ENTHC,HX,PROOT1,PZ,AX,RHOZ,   PROOT1    35
                     1TZ,SZ,HZ,FFF                                              PROOT1    36
                  101 FORMAT(1H ,2HN=I3,1X,2HP=1PE13.6,1X,2HR=1PE13.6,1X,2HU=1PE13.6,1X,  PROOT1    37
                     16HH-CON=1PE13.6,1X,6HH-QSQ=1PE13.6,1X,2HH=1PE13 6,1X,5HROOT=  PROOT1    38
                     21PE13.6 /1H ,4X,5HP/PO=,1PE11.4,1X,2HA=,1PE11.4,1X,5HR/RO=,1PE11.4  PROOT1    39
                     3,1X,2HT=,1PE11.4,1X,4HS/R=,1PE11.4,1X,5HM/RT=,1PE11.4,1X,2HF=,    PROOT1    40
                     4OPF8.4)                                                   PROOT1    41
                      RETURN                                                    PROOT1    42
                  100 NEWP=0                                                    PROOT1    43
                      CALL RGAS(PWR,RHOWR,AX,HX,TX,SX,GASCON,WRGX,-1,2,2)       PROOT1    44
                      RETURN                                                    PROOT1    45
                  102 U=BWR/AWR                                                 PROOT1    46
                      RHOWR=BWR/U                                               PROOT1    47
                      HX=0.0                                                    PROOT1    48
                      GO TO 99                                                  PROOT1    49
                      END                                                       PROOT1    50
```

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 SUBROUTINE RDCODE     76/76   OPT=1                    FTN 4.6+460        06/15/79  18.58.36       PAGE     1

 1                SUBROUTINE RDCODE(P,RHO,U,NR)                                          RDCODE       2
                  EXTERNAL PRODT1                                                        RDCODE       3
                  COMMON/WPCOD0/RWR,BWR,CWR,DWR,UWR,VWR,WWR,PWR,RHOWR,WRC1,NEWR,NTAL     WPCOD0       2
                  COMMON/WPCOD1/K,J,NPHIWR,NT2WR,WRMACH,PKKFUN,WRZ                       WPCOD1       2
 5                COMMON/WPCOD2/RX,HX,TX,SX                                              WPCOD2       2
                  COMMON/CONFG/WRPO,WRPO,WRTO,WRCON,GASCON,WRHO,WRSO,WRAO,WRNTO,WRGX      CONFG        2
                  COMMON/REALG/NREAL,NWRPRT,BODYH,BODYS,PSONIC,RSONIC,P1INF,R1INF        REALG        2
                 *,VIINF,NITRVG,NWROUT                                                   REALG        3
                  LOGICAL BOL,TRN,TRN1,TRN2,TRN3,TPNH,BOL1,APRXPR                        RDCODE       9
 10               LOGICAL LOTST,KTST,T11H,T12H,T21H,T22H,T3L                             RDCODE      10
                  DATA NTOT,NTOT1/0,0/                                                   RDCODE      11
                  DATA LHTSTL,LHTSTH/1HL,1HH/                                            RDCODE      12
                  DATA I123/0/                                                           RDCODE      13
            C     LOGICAL CODES FOR M>0.0                                                RDCODE      14
 15         C        TRN=.TRUE.     STGD MODE                                           RDCODE      15
            C           =.FALSE.    MACH. NO <1 ON 1ST ITER.                            RDCODE      16
            C        TRN1=.FALSE.   STGD MODE                                           RDCODE      17
            C           =.TRUE.     ITER. CONV. SATISFACTORILY, BUT DESIRE PRINT.       RDCODE      18
            C        TRN2=.TRUE.    STGD MODE                                           RDCODE      19
 20         C           =.FALSE.    ROOT NOT WITHIN SPECIFIED BOUNDS, SO BOUNDS ARE     RDCODE      20
            C                         EXPANDED.                                        RDCODE      21
            C        BOL =.TRUE.    STGD MODE                                           RDCODE      22
            C           =.FALSE.    NON-CONVERGENT ITERATION.                           RDCODE      23
                  VPRM=VWR*VWR+WWR*WWR                                                   RDCODE      24
 25               WRC1=BODYH-VPRM*0.5                                                    RDCODE      25
                  UHI=(BWR/RWR)                                                          RDCODE      26
                  IF (I123.EQ.123) GO TO 100                                             RDCODE      27
                  I123=123                                                               RDCODE      28
                  APRXPR=.FALSE.                                                         RDCODE      29
 30               IF (WRMACH.LT.0.0) APRXPR=.TRUE.                                       RDCODE      30
                  CON1=1.0/(2.0*(1.0-PKKFUN))                                            RDCODE      31
                  CON2=4.0*PKKFUN/CON1                                                   RDCODE      32
                  UPER=1.0                                                               RDCODE      33
                  JWH1=NT2WR/3                                                           RDCODE      34
 35               JWH2=2*JWH1                                                            RDCODE      35
                  RMID=0.35                                                              RDCODE      36
                  KWH=NPHIWR/2                                                           RDCODE      37
                  T11H=.FALSE.                                                           RDCODE      38
                  T12H=.FALSE.                                                           RDCODE      39
 40               T21H=.FALSE.                                                           RDCODE      40
                  T22H=.FALSE.                                                           RDCODE      41
                  T3L =.FALSE.                                                           RDCODE      42
                  R11LO=.98                                                              RDCODE      43
                  R11HI=.999                                                             RDCODE      44
 45               R12LO=.98                                                              RDCODE      45
                  R12HI=.999                                                             RDCODE      46
                  R21LO=.98                                                              RDCODE      47
                  R21HI=.999                                                             RDCODE      48
                  R22LO=.98                                                              RDCODE      49
 50               R22HI=.999                                                             RDCODE      50
                  R3LO=.5                                                                RDCODE      51
                  R3HI=.6                                                                RDCODE      52
                  TRN=.TRUE.                                                             RDCODE      53
                  TRN3=.TRUE.                                                            RDCODE      54
 55               TRNH=.TRUE.                                                            RDCODE      55
            100   CONTINUE                                                               RDCODE      56
                  IF (WRAPPR) GO TO 300                                                  RDCODE      57
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```
                TRN=.TRUE.                                                      RDCODE   58
                TRN1=.FALSE.                                                    RDCODE   59
60              TRN2=.TRUE.                                                     RDCODE   60
                KTST=.TRUE.                                                     RDCODE   61
                IF (K.LE.KWR) KTST=.FALSE.                                      RDCODE   62
                IF (J.LT.JWR1) GO TO 80                                         RDCODE   63
                IF (J.GT.JWR2) GO TO 81                                         RDCODE   64
65              JREG=0                                                          RDCODE   65
                IF (KTST) GO TO 83                                              RDCODE   66
                FACTLO=R21LO                                                    RDCODE   67
                FACTHI=R21HI                                                    RDCODE   68
                GO TO 82                                                        RDCODE   69
70          83  CONTINUE                                                        RDCODE   70
                FACTLO=R22LO                                                    RDCODE   71
                FACTHI=R22HI                                                    RDCODE   72
                GO TO 82                                                        RDCODE   73
            80  JREG=-1                                                         RDCODE   74
75              IF (KTST) GO TO 84                                              RDCODE   75
                FACTLO=R11LO                                                    RDCODE   76
                FACTHI=R11HI                                                    RDCODE   77
                GO TO 82                                                        RDCODE   78
            84  CONTINUE                                                        RDCODE   79
80              FACTLO=R12LO                                                    RDCODE   80
                FACTHI=R12HI                                                    RDCODE   81
                GO TO 82                                                        RDCODE   82
            81  JREG=1                                                          RDCODE   83
                FACTLO=R31LO                                                    RDCODE   84
85              FACTHI=R3HI                                                     RDCODE   85
            82  CONTINUE                                                        RDCODE   86
           101  NEWR=1                                                          RDCODE   87
            99  CONTINUE                                                        RDCODE   88
                UL=FACTLO*PUHI                                                  RDCODE   89
90              UH=FACTHI*PUHI                                                  RDCODE   90
            97  CONTINUE                                                        RDCODE   91
                CALL ZEROIN(UL,UH,1.0E-5,PROOT1,BOL,XX,YY)                      RDCODE   92
                IF (BOL) GO TO 102                                              RDCODE   93
                IF (IRN2) GO TO 107                                             RDCODE   94
95              IF (LOTST.AND.JREG.EQ.-1) GO TO 111                             RDCODE   95
                NP=1                                                            RDCODE   96
           504  NWRITP=NWPRT                                                    RDCODE   97
                IF (NWPRT.EQ.-1) GO TO 103                                      RDCODE   98
                NWPRT=4                                                         RDCODE   99
100             CALL ZEROIN(UL,UH,1.0E-5,PROOT1,BOL,XX,YY)                      RDCODE  100
                WRITE (6,501) RWR,BWR,CWR,DWR,VWP,WSP,BODYH,BODYS               RDCODE  101
           501  FORMAT(1HO,65H*PRINT TO CHECK FOR ROOTS OF PROOT1.  THIS IS PRINTED RDCODE  102
               1FROM RDCODE */1H ,3X,2HR=,1PE11.4,1X,2HB=,1PE11.4,1X,2HC=,1PE11.4, RDCODE  103
               21X,2HD=1PE11.4,3X,2HV=,1PE11.4,1X,2HW=,1PE11.4 /1H ,3X,          RDCODE  104
105            33HHT=,1PE11.4,1X,2HS=,1PE11.4)                                  RDCODE  105
                DELTSP=0.01                                                     RDCODE  106
                ULIST=0.0                                                       RDCODE  107
           500  CONTINUE                                                        RDCODE  108
                ULIST=ULIST+DELTSP                                              RDCODE  109
110             IF (ULIST.GE.1.0) GO TO 503                                     RDCODE  110
                XXX=PROOT1(ULIST*UHI)                                           RDCODE  111
                GO TO 500                                                       RDCODE  112
           503  CONTINUE                                                        RDCODE  113
                WRITE (6,502)                                                   RDCODE  114
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115         502   FORMAT(1HO,33HEND OF CHECK FOR ROOTS OF PRDOT1.)                  RDCODE  115
                  NWRPRT=NWRPTP                                                     RDCODE  116
                  GO TO 103                                                         RDCODE  117
              111 RMED=RMED*.9                                                      RDCODE  118
              107 CONTINUE                                                          RDCODE  119
120               TRND=.FALSE.                                                      RDCODE  120
                  UFAIL=UWR                                                         RDCODE  121
                  FACTLO=RMED                                                       RDCODE  122
                  FACTHI=0.999996                                                   RDCODE  123
                  IF (ABS(UWR-UL).LT.0.001*UL) GO TO 96                             RDCODE  124
125               LOTST=.FALSE.                                                     RDCODE  125
                  BFAIL=LH                                                          RDCODE  126
                  LHTSTX=LHTSTH                                                     RDCODE  127
                  GO TO 99                                                          RDCODE  128
              96  LOTST=.TRUE.                                                     RDCODE  129
130               BFAIL=UL                                                          RDCODE  130
                  LHTSTX=LHTSTL                                                     RDCODE  131
                  GO TO 99                                                          RDCODE  132
              102 U=UWR                                                             RDCODE  133
                  P=PWR                                                             RDCODE  134
135               RHO=RHOWR                                                         RDCODE  135
                  IF (AX.NE.0.0) GO TO 110                                          RDCODE  136
                  U=(XX+YY)/2.0                                                     RDCODE  137
                  NEWR=2                                                            RDCODE  138
                  XXX=PRDOT1(U)                                                     RDCODE  139
140               P=PWR                                                             RDCODE  140
                  RHO=RHOWR                                                         RDCODE  141
                  IF (AX.EQ.0.0) GO TO 97                                           RDCODE  142
              110 AMACH=U/AX                                                        RDCODE  143
                  IF (AMACH.GE.1.0) GO TO 108                                       RDCODE  144
145               IF (TRN) GO TO 105                                                RDCODE  145
                  NR=1                                                              RDCODE  146
                  GO TO 106                                                         RDCODE  147
              108 CONTINUE                                                          RDCODE  148
                  NR=0                                                              RDCODE  149
150               IF (K.NE.3) GO TO 109                                             RDCODE  150
                  IF (J.NE.3) GO TO 109                                             RDCODE  151
                  NTOT=0                                                            RDCODE  152
                  NTOT1=0                                                           RDCODE  153
              109 CONTINUE                                                          RDCODE  154
155               NTOT=NTOT+NTRL                                                    RDCODE  155
                  NTOT1=NTOT1+1                                                     RDCODE  156
                  NITAVG=NTOT/NTOT1                                                 RDCODE  157
                  IF (TRN2) GO TO 91                                                RDCODE  158
              C   RESETS ITERATION BOUNDS - - - - - - - - - - - - - - - - - - -    RDCODE  159
160           C   JREG=-1       3.LE.(J).LT.JWR1                                    RDCODE  160
              C         0       JWR1.LE.(J).LT.JWR2                                 RDCODE  161
              C         1       JWR2.LT.(J).LT.NT2WR                                RDCODE  162
              C   LOTST=.TRUE.   ROOT WAS BELOW LOWER BOUND.                        RDCODE  163
              C        .FALSE.  ROOT WAS ABOVE UPPER BOUND.                       RDCODE  164
165           C   KTST=.TRUE.      3.LE.(K).LT.KWR                                  RDCODE  165
              C        .FALSE.     KWR.LT.(K).LT.NPHIWR                           RDCODE  166
              C   T11H,T12H,T21H,T22H,T3L ARE LOGICAL VARIABLES THAT FACILITATE    RDCODE  167
              C     COLLAPSING THE UPPER ITERATION BOUNDS TO REASONABLE VALUES.    RDCODE  168
              C     EACH VARIABLE (SUCH AS R11HI) IS SET ONLY ONCE.  WHEN THIS     RDCODE  169
170           C     OCCURS THE LOGICAL VARIABLES ARE CHANGED FROM .FALSE. TO .TRUE..RDCODE  170
                  DATA BCMOFY/0.025/                                                RDCODE  171
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```
                PERC=U/UHI                                                      RDCODE  172
                RATIOL=PERC                                                     RDCODE  173
                RATIOH=PERC*1.01                                                RDCODE  174
175             IF (RATIOH.GE.1.) RATIOH=0.99999                                RDCODE  175
                IF (JREG) 70,74,78                                              RDCODE  176
          C     CLOSE TO BODY - 1ST THIRD                                       RDCODE  177
          70    IF (LOTST) GO TO 72                                             RDCODE  178
                IF (KTST) GO TO 71                                              RDCODE  179
180             R11HI=RATIOH                                                    RDCODE  180
                IF (T21H) GO TO 65                                              RDCODE  181
                IF (T11H) GO TO 69                                              RDCODE  182
                GO TO 60                                                        RDCODE  183
          65    IF (R11HI.GT.R21LO) R21LO=(R11HI+2.*R21LO)/3.0                  RDCODE  184
185             GO TO 69                                                        RDCODE  185
          71    R12HI=RATIOH                                                    RDCODE  186
                IF (T22H) GO TO 67                                              RDCODE  187
                IF (T12H) GO TO 69                                              RDCODE  188
                GO TO 61                                                        RDCODE  189
190       67    IF (R12HI.GT.R22LO) R22LO=(R12HI+2.*R22LO)/3.0                  RDCODE  190
                GO TO 69                                                        RDCODE  191
          72    IF (KTST) GO TO 73                                              RDCODE  192
                R11LO=RATIOL                                                    RDCODE  193
                IF (T11H) GO TO 69                                              RDCODE  194
195             R11HI=RATIOL*(1.+BCMDFY)                                        RDCODE  195
                IF (R11HI.GE.1.) R11HI=.9999                                    RDCODE  196
          60    T11H=.TRUE.                                                     RDCODE  197
                GO TO 69                                                        RDCODE  198
          73    R12LO=RATIOL                                                    RDCODE  199
200             IF (T12H) GO TO 69                                              RDCODE  200
                R12HI=RATIOL*(1.+BCMDFY)                                        RDCODE  201
                IF (R12HI.GE.1.) R12HI=.9999                                    RDCODE  202
          61    T12H=.TRUE.                                                     RDCODE  203
                GO TO 69                                                        RDCODE  204
205       C     MIDWAY BETWEEN BODY AND SHOCK - 2ND THIRD                       RDCODE  205
          74    IF (LOTST) GO TO 76                                             RDCODE  206
                IF (KTST) GO TO 75                                              RDCODE  207
                R21HI=RATIOH                                                    RDCODE  208
                IF (T2L) GO TO 66                                               RDCODE  209
210             IF (T21H) GO TO 69                                              RDCODE  210
                GO TO 62                                                        RDCODE  211
          66    IF (R21HI.GT.R3LO) R3LO=(R21HI+2.*R3LO)/3.0                     RDCODE  212
                GO TO 69                                                        RDCODE  213
          75    R22HI=RATIOH                                                    RDCODE  214
215             IF (T22H) GO TO 69                                              RDCODE  215
                GO TO 63                                                        RDCODE  216
          76    IF (KTST) GO TO 77                                              RDCODE  217
                R21LO=RATIOL                                                    RDCODE  218
                IF (T21H) GO TO 69                                              RDCODE  219
220             R21HI=RATIOL*(1.+BCMDFY)                                        RDCODE  220
                IF (R21HI.GE.1.) R21HI=.9999                                    RDCODE  221
          62    T21H=.TRUE.                                                     RDCODE  222
                GO TO 69                                                        RDCODE  223
          77    R22LO=RATIOL                                                    RDCODE  224
225             IF (T22H) GO TO 69                                              RDCODE  225
                R22HI=RATIOL*(1.+BCMDFY)                                        RDCODE  226
                IF (R22HI.GE.1.) R22HI=.9999                                    RDCODE  227
          63    T22H=.TRUE.                                                     RDCODE  228
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```
                      GO TO 69                                                  RDCODE  229
230           C       CLOSE TO SHOCK - LAST THIRD                               RDCODE  230
              78      IF (LOTST) GO TO 79                                       RDCODE  231
                      R3HI=RATIOH                                               RDCODE  232
                      IF (T3L) GO TO 69                                         RDCODE  233
                      R3LO=RATIOH*(1.-BCMEFY)                                   RDCODE  234
235           64      T3L=.TRUE.                                                RDCODE  235
                      GO TO 69                                                  RDCODE  236
              79      R3LO=RATIOL                                               RDCODE  237
                      IF (.NOT.T3L) GO TO 64                                    RDCODE  238
              69      GO TO 106                                                 RDCODE  239
240           C       - - - - - - - - - - - - - - - - - - - - - - - - - - - - - RDCODE  240
              91      CONTINUE                                                  RDCODE  241
                      IF (NUMPRT.GE.1) GO TO 106                                RDCODE  242
                      RETURN                                                    RDCODE  243
              105     CONTINUE                                                  RDCODE  244
245                   TRN=.FALSE.                                               RDCODE  245
                      UL=1.0X1MAR                                               RDCODE  246
                      PPCO=UL/ULHI                                              RDCODE  247
                      IF (NUMPRT.GE.1) GO TO 103                                RDCODE  248
                      GO TO 97                                                  RDCODE  249
250           106     CONTINUE                                                  RDCODE  250
                      TRN1=.TRUE.                                               RDCODE  251
              C       ----MONITOR PRINTING-----------------------------------   RDCODE  252
              103     CONTINUE                                                  RDCODE  253
                      IF (NUMPRT.EQ.0) GO TO 115                                RDCODE  254
255                   USQ=UWR*UWR                                               RDCODE  255
                      HTOT=HT+(UVQ+VPFM)*0.5                                    RDCODE  256
                      B=PWR+RHOWR*USQ                                           RDCODE  257
                      A=RHOWR*UWR                                               RDCODE  258
                      IF (AWR.NE.0) A=(AWR-A)/AWR                               RDCODE  259
260                   IF (BWR.NE.0) B  =(BWR-B)/BWR                             RDCODE  260
                      HTOT=(BUOYH-HTOT)/BOOYH                                   RDCODE  261
                      DATA C4,NC4/1.0E+6,6/                                     RDCODE  262
                      A=A*C4                                                    RDCODE  263
                      B=B*C4                                                    RDCODE  264
265                   HTOT=HTOT*C4                                              RDCODE  265
                      IF (UHI.NE.0.0) PERC=UWR/UHI                              RDCODE  266
                      IF (TRN2.AND.(MOD(J,2).EQ.0)) GO TO 115                   RDCODE  267
                      NTA=NTAL/100                                              RDCODE  268
                      AVGNX1=HTOT                                               RDCODE  269
270                   AVGNX2=100*NTOT1                                          RDCODE  270
                      IF (AVGNX2.NE.0.0) AVGNIT=AVGNX1/AVGNX2                   RDCODE  271
                      WRITE (6,104) PRL,NTA,PWR,RHOWR,UWR,MACH,UHI,PERC,AWR,A,B,HTOT,  RDCODE  272
                     1NC4,J,K,AVGNIT                                            RDCODE  273
              104     FORMAT (1H , 5HRDCOD,L1,I2, 2H,P,1PE11.4,   2H,A,1PE11.4,   2H,U,  RDCODE  274
275                  11PE11.4,   2H,M,0PF6.3,   4H,B/A,1PE11.4,   2H,F,0PF7.4    RDCODE  275
                     2,   2H,A,1PE11.4,   0PF5.2,      0PF5.2,3H,HT,0PF8.3,1H,I1,   2H,J  RDCODE  276
                     3,I2,2H,K,I2,1X,0PF6.2)                                    RDCODE  277
                      IF (TRN2) GO TO 120                                       RDCODE  278
                      UFAIL=UFAIL/UHI                                           RDCODE  279
280                   BFAIL=BFAIL/UHI                                           RDCODE  280
                      WRITE (6,119) JREG,KTST,UFAIL,LHTSTX,BFAIL,FACTLO,FACTHI,R11LO,  RDCODE  281
                     1R11HI,R12LO,R12HI,R21LO,R21HI,R22LO,R22HI,R3LO,R3HI,T11H,T12H,  RDCODE  282
                     2T21H,T22H,T3L,UHZ                                         RDCODE  283
              119     FORMAT (1H ,1H(,I2,L1,1H),1X,3HUF=,F8.5,1X,1HB,A1,1H=,F8.5,1X,  RDCODE  284
285                  13HBL=,F8.5,1X,3HBH=,F8.5,1X,5HR11L=,F8.5,1X,5HR11H=,F8.5,1X,5HR12L  RDCODE  285
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```
     2=,F8.5,1X,SHR12H=,F8.5  /1H ,6X,SHR21L=,F8.5,1X,SHR21H=,F8.5,1X,    RDCODE   286
     3SHR22L=,F8.5,1X,SHR22H=,F8.5,1X,4HR3L=,F8.5,1X,4HR3H=,F8.5,2X,5L1   RDCODE   287
     4,3X,6H--- Z=,1PE11.4)                                               RDCODE   288
 120 CONTINUE                                                             RDCODE   289
290  IF (NAIRFT.LE.1.AND.TRN2) GO TO 115                                  RDCODE   290
     IF (AMACH.LE.1.0) GO TO 113                                          RDCODE   291
     UPERH=UPER                                                           RDCODE   292
     IF (APRXPR) GO TO 116                                                RDCODE   293
     RATHU=CON2*VRC1/UHI**2                                               RDCODE   294
295  IF (RATHU.GT.1.) RATHU=1.                                            RDCODE   295
     RADIC=SQRT(1.-RATHU)                                                 RDCODE   296
     UPER=CON1*(1.+RADIC)                                                 RDCODE   297
 116 CONTINUE                                                             RDCODE   298
     UPERL=2.0*CON1-UPERH                                                 RDCODE   299
300  ULMOD=10.                                                            RDCODE   300
     UHMOD=.99*UWR                                                        RDCODE   301
     NTAL5=NTAL                                                           RDCODE   302
     NEWR=1                                                               RDCODE   303
     CALL ZERO1N(ULMOD,UHMOD,1.0E-5,PROOT1,BOL1,XX,YY)                    RDCODE   304
305  SECROT=(XX+YY)/2.0                                                   RDCODE   305
     IF (AX.NE.0.0) AMACH2=SECROT/AX                                      RDCODE   306
     F2ND=SECROT/UHI                                                      RDCODE   307
     RMED=F2ND                                                            RDCODE   308
     NTAL=NTAL5                                                           RDCODE   309
310  ULX=UL/UHI                                                           RDCODE   310
     UHX=UH/UHI                                                           RDCODE   311
     WRITE (6,112) BOL1,UL,UH,ULX,UHX,AMACH2,SECROT,F2ND,UPERL,UPERH,     RDCODE   312
    1TRN,TRN1,TRN2,TRN3,TRNN,APRXPR                                      RDCODE   313
 112 FORMAT(1H ,5X,L1,1X,8H(?T, B)=,2(1PE11.4,1X),2(0PF7.4,1X),4H;M2=     RDCODE   314
315  10PF7.4,1X,3HU2=1PE11.4,1X,3HF2=0PF7.4,2X,11H;<P.G.> FL=,0PF7.4,1X,  RDCODE   315
     23HFH=0PF7.4,1X,6L1)                                                 RDCODE   316
     IF (TRN1) RETURN                                                     RDCODE   317
     IF (NAIRFT.LE.2) GO TO 115                                           RDCODE   318
     SPCAM=(AX**2)*RHO/P                                                  RDCODE   319
320  SPK=(SPCAM-1.0)/(2.0*SPCAM)                                          RDCODE   320
     SPC1=1./(2.0*(1.-SPK))                                               RDCODE   321
     SPC2=4.*SPK/SPC1                                                     RDCODE   322
     SRADIC=PERC/SPC1-1.                                                  RDCODE   323
     SRATHU=1.-SRADIC**2                                                  RDCODE   324
325  WRITE (6,117) SPCAM,CON1,SPC1,CON2,SPC2,RATHU,SRATHU,RADIC,SRADIC    RDCODE   325
 117 FORMAT(1H ,7X,7HCAM-SP=0PF7.3,4H;C1=,2(0PF9.4,1X),4H;C2=,            RDCODE   326
    12(0PF9.4,4X),6H;M/XE=,2(1PE11.4,1X),5H;SQRT=,2(1PE11.4,1X))         RDCODE   327
     GO TO 115                                                            RDCODE   328
 113 CONTINUE                                                             RDCODE   329
330  WRITE (6,114) TRN,TRN1,TRN2,TRN3,TRNN,APRXPR,BOL,BOL1               RDCODE   330
 114 FORMAT(1X,8(L1,1X))                                                  RDCODE   331
 115 CONTINUE                                                             RDCODE   332
     IF (TRN1) RETURN                                                     RDCODE   333
     IF (BOL.AND..NOT.TRN) GO TO 97                                       RDCODE   334
335  IF (BOL.AND..NOT.TRN3) GO TO 302                                     RDCODE   335
     RETURN                                                               RDCODE   336
C    - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -  RDCODE   337
C    - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -  RDCODE   338
C    ITERATION WHEN FLOW IS APPROX PERFECT.                               RDCODE   339
340  C    LOGICAL CODES FOR M<0.0                                         RDCODE   340
C       TRN3=.TRUE.    STGO MODE                                          RDCODE   341
C           =.FALSE.   (SAME AS TRN DEFINED ABOVE)                        RDCODE   342
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      C       TRN4=.TRUE.    STRD MODE                                    RDCODE  343
      C           =.FALSE.   (SAME AS TRN2 DEFINED ABOVE)                 RDCODE  344
345   300   RATHU=CON2*WRC1/UHI**2                                        RDCODE  345
            SQRTAR=1.-RATHU                                             RDCODE  346
            IF (SQRTAR.GE.0.0) GO TO 308                                RDCODE  347
            WRITE (6,309) RATHU,SQRTAR                                  RDCODE  348
      309   FORMAT(1HO,46HNEG. SQ. ROOT IN RDCODE. ARG SET TO ZERO. RATHU=  RDCODE  349
350        1,1PE14.7,1X,10H(1-RATHU)=,1PE14.7)                          RDCODE  350
            SQRTAR=0.0                                                  RDCODE  351
      308   CONTINUE                                                    RDCODE  352
            RADIC=SQRT(SQRTAR)                                          RDCODE  353
            UPER=CON1*(1.+RADIC)                                        RDCODE  354
355         UPERF=UPER*UHI                                              RDCODE  355
            TRN3=.TRUE.                                                 RDCODE  356
            TRN4=.TRUE.                                                 RDCODE  357
            FACTLO=0.95                                                 RDCODE  358
            FACTHI=1.01                                                 RDCODE  359
360   301   NEWR=1                                                      RDCODE  360
      306   UL=FACTLO*UPERF                                             RDCODE  361
            UH=FACTHI*UPERF                                             RDCODE  362
      302   IF (UH.GT.UHI) UH=UHI*.999                                  RDCODE  363
            CALL ZERDIN(UL,UH,1.0E-5,PROOT1,BOL,XX,YY)                  RDCODE  364
365         IF (BOL) GO TO 303                                          RDCODE  365
            IF (TRN4) GO TO 305                                         RDCODE  366
            NR=1                                                        RDCODE  367
            GO TO 504                                                   RDCODE  368
      303   U=UWR                                                       RDCODE  369
370         P=PWR                                                       RDCODE  370
            RHO=RHOWR                                                   RDCODE  371
            IF (AX.NE.0.0) GO TO 307                                    RDCODE  372
            U=(XX+YY)/2.0                                               RDCODE  373
            XXX=PROOT1(U)                                               RDCODE  374
375         P=PWR                                                       RDCODE  375
            RHO=RHOWR                                                   RDCODE  376
      307   AMACH=U/AX                                                  RDCODE  377
            IF (AMACH.GE.1.0) GO TO 108                                 RDCODE  378
            IF (TRN3) GO TO 304                                         RDCODE  379
380         NR=1                                                        RDCODE  380
            GO TO 106                                                   RDCODE  381
      304   CONTINUE                                                    RDCODE  382
            TRN3=.FALSE.                                                RDCODE  383
            UL=1.001*U                                                  RDCODE  384
385         IF (NWRPRT.GE.2) GO TO 103                                  RDCODE  385
            GO TO 302                                                   RDCODE  386
      305   CONTINUE                                                    RDCODE  387
            TRN4=.FALSE.                                                RDCODE  388
            UL=0.5*UPERF                                                RDCODE  389
390         UH=UHI*.999                                                 RDCODE  390
            GO TO 302                                                   RDCODE  391
            END                                                         RDCODE  392
```

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1                                                                                  RGCODE   393
                                                                                   RGCODE   394
      CHA1724   RGAS          AS MODIFIED BY W.A.REINHARDT                        RGAS       2
      CAGASR     WALKER     TEMP CONVERTED TO ARWINE                             RGAS       3
5           SUBROUTINE RGAS(PX,RX,AX,HX,TX,SX,ARX,GX,NTEST,NUMX,NGAS)           RGAS       4
      C     NOTExxx ARRAY DIMENSIONS ARE DIFFERENT THAN ARE GIVEN IN THE         RGAS       5
      C      ORIGINAL VERSION OF RGAS.                                           RGAS       6
      C     DIMENSION NLL(8),JXX(8),DZZ(8),TZ(3000),NDZ(89)                      RGAS       7
            DIMENSION NLL(8),JXX(8),DZZ(8),TZ(2565),NDZ(89)                      RGAS       8
10          DIMENSION TH(5,513),NDL(4,11),NDU(4,11),AN(4),C(7),ANR(17),BN(4)     RGAS       9
            EQUIVALENCE (TZ(1),TH(1,1)),(NDZ(1),NDL(1,1)),(NDZ(45),NDU(1,1))     RGAS      10
            DATA KEY,NTIMES/0,0/                                                 RGAS      11
            DATA WORD1,WORD2/4HHI  ,4HLO  /                                      RGAS      12
      C     DATA NTAPE/7/                                                        RGAS      13
15          DATA NFIRST/0/                                                       RGAS      14
            DATA GTESTR/0./                                                      RGAS      15
      104   KEY=KEY+1                                                            RGAS      16
            P=PX                                                                 RGAS      17
            S=SX                                                                 RGAS      18
20          R=RX                                                                 RGAS      19
            NUM=NUMX                                                             RGAS      20
            NUMGR=0                                                              RGAS      21
            IF (NUM) 20,1,2                                                      RGAS      22
      20    NUMGR=1                                                              RGAS      23
25          NUM=2                                                                RGAS      24
      2     IF(NUM-5) 3,3,4                                                      RGAS      25
      4     WORD=WORD1                                                           RGAS      26
      6     WRITE(6,5) WORD, PX,RX,SX                                            RGAS      27
      5     FORMAT(16H0 ER IN RGAS-NUM ,1X,A4,4H PX=,1PE12.4,4H RX=,1PE12.4,4H   RGAS      28
30         * SX=,1PE12.4)                                                        RGAS      29
      25    RETURN                                                               RGAS      30
      1     WORD=WORD2                                                           RGAS      31
            GO TO 6                                                              RGAS      32
      3     IF(NTEST) 7,8,8                                                      RGAS      33
35    7     IF (NFIRST-NGAS) 10,9,10                                             RGAS      34
      10    NFIRST=NGAS                                                          RGAS      35
      C                                                                          RGAS      36
      C                                                                          RGAS      37
      C                                                                          RGAS      38
40          NTYPRD=2                                                             RGAS      39
      C     NTYPRD=1   READS TAPE.                                               RGAS      40
      C            2   READS CARDS.                                             RGAS      41
      C            3   READS DISK.                                              RGAS      42
      C                                                                          RGAS      43
45          GO TO (53,54,55),NTYPRD                                              RGAS      44
      C                                                                          RGAS      45
      C     THE FOLLOWING COMMENTS CARDS EXPLAIN TAPE READ PROCEDURE.            RGAS      46
      53    CONTINUE                                                             RGAS      47
      C     READ(7,201) WTMIX,(C(N),N=1,7)                                       RGAS      48
50    C     READ(7,200) (NDZ(N),N=1,89)                                          RGAS      49
            DATA NPM/2563/                                                       RGAS      50
      C     NPM=NDZ(89)                                                          RGAS      51
      C 200 FORMAT(16I8)                                                         RGAS      52
      C 201 FORMAT(8E16.8)                                                       RGAS      53
55    C     READ(7,201) (TZ(N),N=1,NPM)                                          RGAS      54
            GO TO 56                                                             RGAS      55
      54    CONTINUE                                                             RGAS      56
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                C***  CARD READ PROCEDURE BEG.                                  RGAS    57
                      READ ( 5,2012) WTMIX,(C(N),N=1,7)                         RGAS    58
60              2012  FORMAT(5(1PE15.7))                                        RGAS    59
                      READ  ( 5,2013) (NOZ(N),N=1,89)                           RGAS    60
                2013  FORMAT(1216)                                             RGAS    61
                      READ  ( 5,2012) (TZ(N),N=1,NPM)                           RGAS    62
                C***  CARD READ PROCEDURE END.                                  RGAS    63
65                    GO TO 56                                                  RGAS    64
                55    CONTINUE                                                  RGAS    65
                      READ  ( 5) WTMIX,(C(N),N=1,7),(NOZ(N),N=1,89),(TZ(N),N=1,2563)  RGAS  66
                56    CONTINUE                                                  RGAS    67
                C                                                               RGAS    68
70              C                                                               RGAS    69
                      DO 120 N=1,88                                             RGAS    70
                120   NOZ(N)=5*NOZ(N)                                           RGAS    71
                      CONC=WTMIX/28.966                                         RGAS    72
                C     CONC(AIR)=28.858566/28.966=.9962910                       RGAS    73
75              C     PO=(ATM.) 2116. LB PER FT**2                              RGAS    74
                      PO=2116.                                                  RGAS    75
                C     RO=STED DENSITY=2.378E-3 SLUGS/FT**3                      RGAS    76
                      RO=.002378*CONC                                           RGAS    77
                C***  SP. GAS CONSTANT= 1716 FT-LB PER SLUG DEG. RANKIN= (FT/SEC)**2  RGAS  78
80                    RRR=1716./CONC                                            RGAS    79
                      RRX=RRR                                                   RGAS    80
                C     493.635 APPROX. STND TEMP (491.69 DEG. F OR 273.16 DEG. K)  RGAS  81
                      RTO=RRR*493.635                                           RGAS    82
                      SQPORO=SQRT (RO/PO)                                       RGAS    83
85                    B=TZ(NPM-2)                                               RGAS    84
                      E=TZ(NPM-1)                                               RGAS    85
                      D=TZ(NPM)                                                 RGAS    86
                      FM=2.1632+.3468*CONC                                      RGAS    87
                      AA=D*FM                                                   RGAS    88
90                    BB=E*FM+1.                                                RGAS    89
                      CCC=B*FM                                                  RGAS    90
                9     P=ALOG10(P/PO)                                            RGAS    91
                11    IF (NUM-5) 40,31,4                                        RGAS    92
                C***  (NUM.EQ.5) DEPENDENT VARIABLES ARE PRESSURE AND ENTROPY   RGAS    93
95              31    REAL=5/NUM                                                RGAS    94
                      GG=(1.-REAL-C(1)-C(2)*P)/(C(3)+P*(C(4)+P*C(5)))           RGAS    95
                110   R=C(6)*GG+C(7)*P                                          RGAS    96
                      RL=P-B                                                    RGAS    97
                      CC=CCC-P                                                  RGAS    98
100                   RH=-CC*(1.+AA*CC/(RB*BB))/BB+.005                         RGAS    99
                      IF(RH+7.)183,185,185                                      RGAS   100
                183   RH=-7.                                                    RGAS   101
                185   IF(R-RH) 180,181,181                                      RGAS   102
                180   R=RH                                                      RGAS   103
105             184   RL=3.                                                     RGAS   104
                181   IF(3.-RL) 184,186,186                                     RGAS   105
                186   IF(RL-R) 182,163,163                                      RGAS   106
                182   R=RL                                                      RGAS   107
                163   NUMB=0                                                    RGAS   108
110                   NIMX=0                                                    RGAS   109
                35    NUMM=5                                                    RGAS   110
                      NBOT=9-NUM                                                RGAS   111
                      NUP=NBOT                                                  RGAS   112
                      GO TO 42                                                  RGAS   113
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115          C***  (1.GE.NUM.LE.4) DEPENDENT VARIABLES ARE PRESSURE AND DENSITY                RGAS  114
             40    R=ALOG10(R/RO)                                                              RGAS  115
                   NUM1=5                                                                      RGAS  116
                   NBOT=1                                                                      RGAS  117
                   NUP=NUM                                                                     RGAS  118
120                IF (NUM&R.EQ.1) NBOT=2                                                      RGAS  119
             42    CONTINUE                                                                    RGAS  120
                   IF(R) 12,12,13                                                              RGAS  121
             12    NR=R-1.                                                                     RGAS  122
                   IF(NR+7) 16,16,15                                                           RGAS  123
125          16    NR=-7                                                                       RGAS  124
                   GO TO 15                                                                    RGAS  125
             13    NR=R                                                                        RGAS  126
                   IF(NR-3) 15,14,14                                                           RGAS  127
             14    NR=2                                                                        RGAS  128
130          15    DX=R-FLOAT (NR)                                                             RGAS  129
                   NR=NR+8                                                                     RGAS  130
                   F=(P-R-B)/(1.+R*(E+DR*R))                                                   RGAS  131
                   IF(NUM1-9+NUM) 22,162,22                                                    RGAS  132
             162   IF(F-.00001) 27,161,161                                                     RGAS  133
135          161   IF(FM-F) 44,22,22                                                           RGAS  134
             22    DO 17 N1=NBOT,NUP                                                           RGAS  135
                   IF(N1-NUM1) 36,81,36                                                        RGAS  136
             36    NER1=N1                                                                     RGAS  137
                   NER2=N1+4                                                                   RGAS  138
140                NL=NDL(N1,NR)                                                               RGAS  139
                   IF(NLL(NER1)-NL) 301,302,301                                                RGAS  140
             302   J=JXX(NER1)                                                                 RGAS  141
                   DIFF2=F-TH(5,J)                                                             RGAS  142
                   IF(DIFF2) 301,308,308                                                       RGAS  143
145          308   IF(DZZ(NER1)-ABS (DIFF2)) 301,301,303                                       RGAS  144
             301   NU=NDU(N1,NR)                                                               RGAS  145
                   CALL SERCH(F,TH,NL,NU,5,J,NER)                                              RGAS  146
                   J=J/5                                                                       RGAS  147
                   DZZ(NER1)=ABS (TH(5,J+1)-TH(5,J))                                           RGAS  148
150                JXX(NER1)=J                                                                 RGAS  149
                   NLL(NER1)=NL                                                                RGAS  150
             303   XYZ=XYZ                                                                     RGAS  151
                   NL=NDL(N1,NR+1)                                                             RGAS  152
                   IF(NLL(NER2)-NL) 305,306,305                                                RGAS  153
155          306   K=JXX(NER2)                                                                 RGAS  154
                   DIFF2=F-TH(5,K)                                                             RGAS  155
                   IF(DIFF2) 305,309,309                                                       RGAS  156
             309   IF(DZZ(NER2)-ABS(DIFF2)) 305,305,307                                        RGAS  157
             305   NU=NDU(N1,NR+1)                                                             RGAS  158
160                CALL SERCH(F,TH,NL,NU,5,K,NER)                                              RGAS  159
                   K=K/5                                                                       RGAS  160
             100   MI=MM                                                                       RGAS  161
                   DZZ(NER2)=ABS (TH(5,K+1)-TH(5,K))                                           RGAS  162
                   JXX(NER2)=K                                                                 RGAS  163
165                NLL(NER2)=NL                                                                RGAS  164
             307   Y1=TH(1,J)+F*(TH(2,J)+F*(TH(3,J)+F*TH(4,J)))                                RGAS  165
             128   Y2=TH(1,K)+F*(TH(2,K)+F*(TH(3,K)+F*TH(4,K)))                                RGAS  166
                   AN(N1)=Y1+DX*(Y2-Y1)                                                        RGAS  167
                   GO TO 17                                                                    RGAS  168
170          81    AN(N1)=REAL                                                                 RGAS  169
             17    CONTINUE                                                                    RGAS  170
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                      IF (NUMGR.EQ.1) GO TO 18                                  RGAS    171
                      IF (NUM-5) 51,52,4                                        RGAS    172
                51    GO TO (121,122,123,124,124),NUM                           RGAS    173
175           124     IF (NUM.NE.5) SX=AN(4)**RRR                               RGAS    174
              123     TX= AN(3)*1.8                                             RGAS    175
              122     HX=AN(2)*RTO                                              RGAS    176
              121     AX=AN(1)/SQFORD                                           RGAS    177
                      RETURN                                                    RGAS    178
180           18      HX=AN(2)*RTO                                              RGAS    179
                      RETURN                                                    RGAS    180
                52    IF(NUMM-9-NUM) 39,108,39                                  RGAS    181
              108     RX=RD*10.**RR                                             RGAS    182
                      GO TO 51                                                  RGAS    183
185           39      DIFF=ABS ((REAL-AN(NUP))/REAL)                            RGAS    184
                      IF(DIFF-.0001)  37,37,38                                  RGAS    185
                37    NUMM=9-NUM                                                RGAS    186
                      NBOT=1                                                    RGAS    187
                      NUP=4                                                     RGAS    188
190                   GO TO 42                                                  RGAS    189
                38    NUMB=NUMB+1                                               RGAS    190
                      NIMX=NIMX+1                                               RGAS    191
                      IF(NIMX-20) 43,43,44                                      RGAS    192
                43    IF(NUMB-2)82,83,84                                        RGAS    193
195           82      IF(REAL-AN(NUP)) 85,37,86                                 RGAS    194
              85      R1=R                                                      RGAS    195
              141     S1=AN(NUP)                                                RGAS    196
                      R=R+.3                                                    RGAS    197
                      IF(RL-R)150,99,99                                         RGAS    198
200           150     R=RL                                                      RGAS    199
              99      R2=R                                                      RGAS    200
              151     L=0                                                       RGAS    201
                      GO TO 42                                                  RGAS    202
              86      R2=R                                                      RGAS    203
205           153     S2=AN(NUP)                                                RGAS    204
                      R=R-.3                                                    RGAS    205
                      IF(R-RH)142,102,102                                       RGAS    206
              142     R=RH                                                      RGAS    207
              102     R1=R                                                      RGAS    208
210           143     L=1                                                       RGAS    209
                      GO TO 42                                                  RGAS    210
              83      IF(L) 91,90,91                                            RGAS    211
              90      S2=AN(NUP)                                                RGAS    212
              126     R=R2-(S2      -REAL)/(S2-S1)*(R2-R1)                      RGAS    213
215                   IF(RL-R) 187,93,93                                        RGAS    214
              187     R=RL                                                      RGAS    215
                      GO TO 93                                                  RGAS    216
              91      S1=AN(NUP)                                                RGAS    217
              127     R=(REAL-S1      )/(S2-S1)*(R2-R1)+R1                      RGAS    218
220                   IF(R-RH) 188,93,93                                        RGAS    219
              188     R=RH                                                      RGAS    220
              93      IF(R2-R) 104,37 ,105                                      RGAS    221
              104     NUMB=1                                                    RGAS    222
                      R1=R2                                                     RGAS    223
225                   S1=S2                                                     RGAS    224
                      L=0                                                       RGAS    225
                      IF(R2+.3-RL) 210,211,211                                  RGAS    226
              211     R2=RL                                                     RGAS    227
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```
                      R=R2                                                  RGAS      228
230                   GO TO 92                                              RGAS      229
                210   R2=R2+.3                                              RGAS      230
                      R=R2                                                  RGAS      231
                      GO TO 92                                              RGAS      232
                105   IF(R-R1) 106,37,42                                    RGAS      233
235             106   NUMB=1                                                RGAS      234
                      R2=R1                                                 RGAS      235
                      S2=S1                                                 RGAS      236
                      L=1                                                   RGAS      237
                      IF(RH-R1+.3) 212,213,213                              RGAS      238
240             213   R1=RH                                                 RGAS      239
                      R=R1                                                  RGAS      240
                      GO TO 92                                              RGAS      241
                212   R1=R1-.3                                              RGAS      242
                      R=R1                                                  RGAS      243
245                   GO TO 92                                              RGAS      244
                84    IF(REAL-RH(NUP)) 87,87,88                             RGAS      245
                87    R1=R                                                  RGAS      246
                      GO TO 91                                              RGAS      247
                88    R2=R                                                  RGAS      248
250                   GO TO 90                                              RGAS      249
                44    IF(F-.000001) 27,444,444                              RGAS      250
                444   NTIMES=NTIMES+1                                       RGAS      251
                      WRITE(6,190)                                          RGAS      252
                190   FORMAT(1H0,10X,36HOUTSIDE TABLES IN RGAS ENTERING WITH)  RGAS   253
255                   WRITE(6,191) PX                                       RGAS      254
                191   FORMAT(11X,2HP=,E13.6)                                RGAS      255
                      IF(NUM-5) 192,193,193                                 RGAS      256
                192   WRITE(6,194) RX                                       RGAS      257
                194   FORMAT(11X,2HR=E14.6)                                 RGAS      258
260                   GO TO 196                                             RGAS      259
                193   WRITE(6,195) SX                                       RGAS      260
                195   FORMAT(11X,2HS=,E13.6)                                RGAS      261
                196   IF (NTIMES-10) 199,197,197                            RGAS      262
                197   WRITE(6,198)                                          RGAS      263
265             198   FORMAT(20X,28HEXIT CALLED ON TENTH FAILURE)           RGAS      264
                      GO TO 25                                              RGAS      265
                199   RETURN                                                RGAS      266
                C***  PERFECT GAS COMPUTATIONS START HERE                   RGAS      267
                8     L=0                                                   RGAS      268
270                   IF(GTEST-GX) 84,441,84                                RGAS      269
                84    GTEST= GX                                             RGAS      270
                      L1=2                                                  RGAS      271
                      RWR(1)=RRX                                            RGAS      272
                C***  RWR(1)=GAS CONSTANT                                   RGAS      273
275                   RWR(2)=GX                                             RGAS      274
                C***  RWR(2)=ISENTROPIC EXPONENT                            RGAS      275
                      RWR(3)=RWR(1)/(RWR(2)-1.)                             RGAS      276
                C***  RWR(3)=DIMENSIONLESS SPECIFIC HEAT (CONST. DENSITY)   RGAS      277
                      RWR(4)=RWR(1)+RWR(3)                                  RGAS      278
280             C***  RWR(4)=DIMENSIONLESS SPECIFIC HEAT (CONST. PRESSURE)  RGAS      279
                      RWR(8)=4900.8.609-RWR(3)*ALOG(171.6/.0001 **RWR(2))   RGAS      280
                C***  RWR(8)= REFERENCE ENTROPY                             RGAS      281
                28    RWR(L+5)=1./RWR(L+2)                                  RGAS      282
                      RWR(L+6)=RWR(L+4)/RWR(L+1)                            RGAS      283
285                   RWR(L+7)=RWR(L+6)/RWR(L+2)                            RGAS      284
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```
                441   GO TO (440,440,440,440,69,70,71,72),NUM                    RGAS  285
                440   QUOD=P/R**RNR(L+2)                                         RGAS  286
                      QUOT=P/R                                                   RGAS  287
                      GO TO(65,66,67,68,69,70,71,72),NUM                         RGAS  288
290             68    S=RNR(L+8)+RNR(L+3)*ALOG(QUOD)                             RGAS  289
                67    T=QUOT/RNR(L+1)                                            RGAS  290
                66    H=QUOT*RNR(L+6)                                            RGAS  291
                65    LL=L+L1                                                    RGAS  292
                      A=SQRT (RNR(LL )*QUOT)                                     RGAS  293
295                   GO TO 30                                                   RGAS  294
                69    EX=S-RNR(L+8)                                              RGAS  295
                      EX=EXP (EX/RNR(L+3))                                       RGAS  296
                      R=(P/EX)**RNR(L+5)                                         RGAS  297
                      QUOD=P/R**RNR(L+2)                                         RGAS  298
300                   QUOT=P/R                                                   RGAS  299
                      GO TO 67                                                   RGAS  300
                70    R=P/(T*RNR(L+1))                                           RGAS  301
                      QUOD=P/R**RNR(L+2)                                         RGAS  302
                      QUOT=P/R                                                   RGAS  303
305                   S=RNR(L+8)+RNR(L+3)*ALOG(QUOD)                             RGAS  304
                      GO TO 66                                                   RGAS  305
                71    ASSIGN 65 TO NJUMP                                         RGAS  306
                73    T=H/RNR(L+4)                                               RGAS  307
                      R=P/(T*RNR(L+1))                                           RGAS  308
310                   QUOD=P/R**RNR(L+2)                                         RGAS  309
                      QUOT=P/R                                                   RGAS  310
                      S=RNR(L+8)+RNR(L+3)*ALOG(QUOD)                             RGAS  311
                      GO TO NJUMP,(65,30)                                        RGAS  312
                72    ASSIGN 30 TO NJUMP                                         RGAS  313
315                   H=RNR(L+7)*R**2                                            RGAS  314
                      GO TO 73                                                   RGAS  315
                30    RX=R                                                       RGAS  316
                      HX=H                                                       RGAS  317
                      TX= T                                                      RGAS  318
320                   IF (NUM.NE.5) SX=S                                         RGAS  319
                      IF (NUM.EQ.5) RX=R                                         RGAS  320
                109   RETURN                                                     RGAS  321
                C***  F .LT. (1.0E-6)                                           RGAS  322
                27    L=8                                                        RGAS  323
325                   P=PX                                                       RGAS  324
                      R=RX                                                       RGAS  325
                      IF(GTESTR-GX) 24,441,24                                    RGAS  326
                24    GTESTR=GX                                                  RGAS  327
                      L1=9                                                       RGAS  328
330                   Z2=RO/10.**7                                               RGAS  329
                      PR=-7.*8                                                   RGAS  330
                      PR=PO*10.**PR                                              RGAS  331
                      Z1=PR                                                      RGAS  332
                      DO 21 N1=1,4                                               RGAS  333
335                   NL=NDL(N1,1)                                               RGAS  334
                      NU=NDU(N1,1)                                               RGAS  335
                      F=0.                                                       RGAS  336
                      CALL SERCH(F,TH,NL,NU,5,J,NER)                             RGAS  337
                      J=J/5                                                      RGAS  338
340             21    BN(N1)=TH(1,J)                                             RGAS  339
                      BN(1)=BN(1)/SQPORO                                         RGAS  340
                      BN(2)=BN(2)*RTO                                            RGAS  341
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                BN(3)=BN(3)*1.8                                          RGAS    342
                BN(4)=BN(4)*RRR                                          RGAS    343
345             ANR(9)=PR/(Z2 *BN(3))                                    RGAS    344
                RRX=ANR(9)                                               RGAS    345
                ANR(12)=BN(2)/BN (3)                                     RGAS    346
                ANR(10)=1.+ANR(9)/(ANR(12)-ANR(9))                       RGAS    347
                ANR(11)=ANR(12)/ANR(10)                                  RGAS    348
350             ANR(17)=BN(1)*BN(1)*Z2/Z1                                RGAS    349
                ANR(16)=BN(4)-ANR(11)*ALOG(Z1/Z2**ANR(10))               RGAS    350
                GO TO 26                                                 RGAS    351
                END                                                      RGAS    352
```

```
      FUNCTION RHOFN      76/76   OPT=1                    FTN 4.6+460      06/15/79  18.58.34      PAGE     1

 1                FUNCTION RHOFN(P,HT,GSG)                                  RHOFN      2
                  COMMON/CONRG/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX         CONRG1     2
                  COMMON/WPLK03/PIT,HTOT,GSG2                               WPLK03     2
                  EXTERNAL RROOT                                            RHOFN      5
 5                LOGICAL BOL                                               RHOFN      6
                  RL=1.0E-7*RO                                              RHOFN      7
                  RH=1.0E+3*RO                                              RHOFN      8
                  PIT=P                                                     RHOFN      9
                  HTOT=HT                                                   RHOFN     10
10                GSG2=GSG/2.                                               RHOFN     11
                  CALL ZEROIN(RL,RH,1.0E-5,RROOT,BOL,XX,YY)                 RHOFN     12
                  RHOFN=(XX+YY)/2.0                                         RHOFN     13
                  IF (BOL) GO TO 102                                        RHOFN     14
                  WRITE (6,101) XX,YY,RHOFN                                 RHOFN     15
15          101   FORMAT(1H0,22HERROR RETURN IN RHOFN ,3(1PE13.5))          RHOFN     16
            102   RETURN                                                    RHOFN     17
                  END                                                       RHOFN     18
```

```
1               FUNCTION RRDOT(RHO)                                          RRDOT     2
                COMMON/CONRG/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX            CONRG1    2
                COMMON/WRK03/PIT,HTOT,QSQ2                                   WRK03     2
                CALL RGAS(PIT,RHO,AX,HX,TX,SX,GASCON,GX,-1,-1,2)             RHODT     5
5               FUN=1.0-(HX+QSQ2)/HTOT                                       FIDT      6
                RRDOT=FUN                                                    RRDOT     7
                RETURN                                                       RRDOT     8
                END                                                          RRDOT     9
```

```
      1            SUBROUTINE RSHOCK(P1,R1,U1,A1,H1,T1,S1,P2,R2,U2,A2,H2,T2,S2)                RSHOCK     2
                   COMMON/CONPG/PO,RO,TO,CONC,GASCON,HO,SO,AO,RTO,GX                          CONPG1     2
                   COMMON/PEALG/ISREAL,NWRPRT,BOOYH,BOOYS,PSONIC,RSONIC,PIINF,R1INF           PEALG      2
                  *,VIINF,NITAVG,NWROUT                                                       PEALG      3
      5            DIMENSION NX(30),XPMIN(30),XP2(30),XPMAX(30)                             RSHOCK     5
                   DATA NTOT/30/                                                            RSHOCK     6
                   DATA I123/0/                                                             RSHOCK     7
                   DATA P1X,R1X/0.,0./                                                      RSHOCK     8
                   IF (I123.EQ.123) GO TO 99                                                RSHOCK     9
     10            I123=123                                                                 RSHOCK    10
                   RRX=GASCON                                                               RSHOCK    11
                   TEST=5.0E-5                                                              RSHOCK    12
            99     CONTINUE                                                                 RSHOCK    13
                   U1X=U1                                                                   RSHOCK    14
     15            IF (P1.EQ.P1X.AND.R1.EQ.R1X) GO TO 98                                    RSHOCK    15
                   P1X=P1                                                                   RSHOCK    16
                   R1X=R1                                                                   RSHOCK    17
                   CALL RGAS(P1X,R1X,A1,H1X,T1,S1,RRX,GX,-1,4,2)                            RSHOCK    18
                   H1=H1X                                                                   RSHOCK    19
     20            CONTINUE                                                                 RSHOCK    20
            98     U12=U1*U1                                                                RSHOCK    21
                   H1TOT=H1X+0.5*U12                                                        RSHOCK    22
            110    C1=U1*H1                                                                 RSHOCK    23
                   C2=P1+U1*C1                                                              RSHOCK    24
     25            C3=H1TOT                                                                 RSHOCK    25
                   C15=C1*C1                                                                RSHOCK    26
                   C4=.5*(C2*C2/C15-C3                                                      RSHOCK    27
                   C5=C2/C15                                                                RSHOCK    28
                   C6=.5/C15                                                                RSHOCK    29
     30            N=1                                                                      RSHOCK    30
                   IF (NWRPRT.LE.2) GO TO 108                                               RSHOCK    31
                   DO 109 KZ=1,30                                                           RSHOCK    32
                   NX(KZ)=0                                                                 RSHOCK    33
                   XPMIN(KZ)=0.0                                                            RSHOCK    34
     35            XP2(KZ)=0.0                                                              RSHOCK    35
            109    XPMAX(KZ)=0.0                                                            RSHOCK    36
            108    CONTINUE                                                                 RSHOCK    37
                   EMIN=U1/A1                                                               RSHOCK    38
                   IF (EMIN.GT.7.) GO TO 1091                                               RSHOCK    39
     40            WT1=3.                                                                   RSHOCK    40
                   WT2=4.                                                                   RSHOCK    41
                   GO TO 1092                                                               RSHOCK    42
            1091   CONTINUE                                                                 RSHOCK    43
                   WT1=2.                                                                   RSHOCK    44
     45            WT2=3.                                                                   RSHOCK    45
            1092   CONTINUE                                                                 RSHOCK    46
                   PSTR=(GX+1.0)/((GX-1.0)+2.0/(EMIN*EMIN))                                 RSHOCK    47
                   PMIN=P1+(C2-P1)*(PSTR-1.)/PSTR                                           RSHOCK    48
                   PMAX=C2                                                                  RSHOCK    49
     50            CONTINUE                                                                 RSHOCK    50
                   P2=(WT1*PMIN+PMAX)/WT2                                                   RSHOCK    51
                   IF (NWRPRT.LE.2) GO TO 1111                                              RSHOCK    52
                   IF (N.GE.NTOT) GO TO 1111                                                RSHOCK    53
                   NX(N)=N                                                                  RSHOCK    54
     55            NLAST=N                                                                  RSHOCK    55
                   XPMIN(N)=PMIN                                                            RSHOCK    56
                   XP2(N)=P2                                                                RSHOCK    57
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                XPMAX(N)=PMAX                                                   RSHOCK     58
             1111 CONTINUE                                                      RSHOCK     59
   60             PMAX1=PMAX/PMIN                                              RSHOCK     60
                  DELT1=PMAX1-1.0                                              RSHOCK     61
             112  R=C15/(C2-P2)                                                RSHOCK     62
                  IF (N.NPRT.GT.2) WRITE (6,122) P2,R,PMAX,PMIN,C1,C2,C5       RSHOCK     63
             122  FORMAT(1H ,12HRSHOCK- P2=,1PE12.5,1X,2HR=,1PE12.5,1X,5HPMAX=1PE12.  RSHOCK     64
   65       *5,                                                                 RSHOCK     65
            21X,5HPMIN=1PE12.5,1X,3HCM=1PE11.4,1X,3HCP=1PE11.4,1X,3HCN=1PE11.4) RSHOCK     66
                  CALL RGAS(P2,R,R2,H2,T2,S2,GASCON,GX,-1.4,2)                 RSHOCK     67
                  DELTA=CN+P2*(P2*(C6-C5)+H2                                   RSHOCK     68
                  IF (DELTA) 113,116,114                                       RSHOCK     69
   70             PMAX=P2                                                      RSHOCK     70
                  GO TO 115                                                    RSHOCK     71
             114  PMIN=P2                                                      RSHOCK     72
                  WT1=1                                                        RSHOCK     73
                  WT2=2                                                        RSHOCK     74
   75        115  CONTINUE                                                     RSHOCK     75
                  N=N+1                                                        RSHOCK     76
                  IF (N.GT.500) GO TO 120                                      RSHOCK     77
                  IF (ABS(DELT1).GT.1.0E-6) GO TO 111                          RSHOCK     78
             116  P2=C15/(C2-P2)                                               RSHOCK     79
   80             U2=C1/P2                                                     RSHOCK     80
                  IF (N.NPRT.EQ.0) RETURN                                      RSHOCK     81
                  IF (N.NPRT.LE.2) RETURN                                      RSHOCK     82
                  K3=0                                                         RSHOCK     83
             101  CONTINUE                                                     RSHOCK     84
   85             K1=K3+1                                                      RSHOCK     85
                  K2=K1+2                                                      RSHOCK     86
             102  WRITE (6,100) (NR(KK),XPMIN(KK),XP2(KK),XPMAX(KK),KK=K1,K3)  RSHOCK     87
                  IF (K2.GE.NLAST) GO TO 103                                   RSHOCK     88
             100  FORMAT(1H ,3,2X,I2,1X,1PE12.5,1X,1PE12.5,1X,1PE12.5))       RSHOCK     89
   90             GO TO 101                                                    RSHOCK     90
             103  CONTINUE                                                     RSHOCK     91
                  RETURN                                                       RSHOCK     92
             120  WRITE (6,121)                                                RSHOCK     93
             121  FORMAT(1HO,21HERROR IN NORMAL SHOCK)                         RSHOCK     94
   95             RETURN                                                       RSHOCK     95
                  END                                                          RSHOCK     96
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SUBROUTINE RUITLD     76/76   OPT=1                FTN 4.6+466      06/15/79  18.58.36      PAGE     1

                      SUBROUTINE RUITLD(P2X,R2X,U1X)                                          RUITLD     2
                      COMMON/CONFIG/PD,RD,TD,CONC,GASCON,MO,SO,RO,RTD,GX                      CONFIG     2
                      COMMON/REALG/NREAL,NLAPRT,BODYM,BODYS,PSONIC,RSONIC,PIINF,RIINF         REALG      2
                     *,VIINF,NITPVG,NWROUT                                                    REALG      3
                      DIMENSION P2T(350),R2T(350),U1T(350)                                    RUITLD     5
                      DATA NWNTOT/350/                                                        RUITLD     6
                      DATA UP,DN,UPD,DND/4HUP(1)-,4HUP(2)-,4HDN(1D,4HDN(2D/                   RUITLD     7
                      DATA PI,RI/0.,0./                                                       RUITLD     8
                      IF (PI.EQ.PIINF.AND.RI.EQ.RIINF) GO TO 110                              RUITLD     9
                      RRX=GASCON                                                              RUITLD    10
                      AMACHM=10.                                                              RUITLD    11
                  101 CONTINUE                                                                RUITLD    12
                      IF (NLAPRT.NE.0) WRITE (6,102)                                          RUITLD    13
                  102 FORMAT(1H1,2X,24HNORMAL SHOCK CONDITIONS /1HO,18X,1HP,14X,3HRHO,12X,    RUITLD    14
                     13HVEL.,12X,5HSOUND,10X,4HMACH,11X,4HTEMP.,11X,5HENTRO)                  RUITLD    15
                      P1=PIINF                                                                RUITLD    16
                      R1=RIINF                                                                RUITLD    17
                      CALL RGAS(P1,R1,R1,HR,T1,S1,RRX,GX,-1,4,2)                              RUITLD    18
                      NN=1                                                                    RUITLD    19
                      U1=A1                                                                   RUITLD    20
                      N=1                                                                     RUITLD    21
                  103 CALL RSHOCK(P1,R1,U1,A1,HR,T1,S1,P2,R2,U2,A2,H2,T2,S2)                   RUITLD    22
                      IF (N.GT.NWNTOT) GO TO 114                                              RUITLD    23
                      U1T(N)=U1                                                               RUITLD    24
                      P2T(N)=P2                                                               RUITLD    25
                      R2T(N)=R2                                                               RUITLD    26
                      NTOT=N                                                                  RUITLD    27
                      U1Y=U1/A1                                                               RUITLD    28
                      IF (NLAPRT.EQ.0) GO TO 107                                              RUITLD    29
                      IF (N.NE.1) GO TO 106                                                   RUITLD    30
                      P1Y=P1/PD                                                               RUITLD    31
                      R1Y=R1/RD                                                               RUITLD    32
                      H1Y=HR/RTD                                                              RUITLD    33
                      T1Y=T1/1.8                                                              RUITLD    34
                      S1Y=S1/GASCON                                                           RUITLD    35
                      CM1=R1*U1                                                               RUITLD    36
                      CP1=P1+U1*CM1                                                           RUITLD    37
                      CH1=HR+U1*U1*RD.5                                                       RUITLD    38
                      WRITE (6,1040)CM1,CP1,CH1                                               RUITLD    39
                 1040 FORMAT(1HO,11X,19HUPSTREAM CONDITIONS,2X,4HCM1=1PE13.6,1X,4HCP1=       RUITLD    40
                     1PE13.6,1X,4HCH1=1PE13.6)                                                RUITLD    41
                      N2=N-1                                                                  RUITLD    42
                      WRITE (6,1041)N2,UP,P1Y,R1Y,U1Y,A1,H1Y,T1Y,S1Y                          RUITLD    43
                      WRITE (6,1041)N2,UPD,P1,R1,U1,A1,HR,T1,S1                               RUITLD    44
                  106 CONTINUE                                                                RUITLD    45
                      U1Y=U1/A1                                                               RUITLD    46
                      CM1=R1*U1                                                               RUITLD    47
                      CP1=P1+U1*CM1                                                           RUITLD    48
                      CH1=HR+U1*U1*RD.5                                                       RUITLD    49
                      WRITE (6,1043) U1,U1Y,CM1,CP1,CH1                                       RUITLD    50
                 1043 FORMAT(1HO,15HUPSTREAM VEL=,1PE15.7,1X,5HMACH=0PF9.5 ,10X,4HCM1=       RUITLD    51
                     1PE13.6,1X,4HCP1=1PE13.6,1X,4HCH1=1PE13.6)                               RUITLD    52
                      P2Y=P2/PD                                                               RUITLD    53
                      R2Y=R2/RD                                                               RUITLD    54
                      U2Y=U2/A2                                                               RUITLD    55
                      H2Y=H2/RTD                                                              RUITLD    56
                      T2Y=T2/1.8                                                              RUITLD    57
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                S2Y=S2/GRSCON                                                   RU1TLD     58
                CM2=R2*U2                                                       RU1TLD     59
60              CP2=P2+U2*CM2                                                   RU1TLD     60
                CH2=H2+U2*U2*0.5                                                RU1TLD     61
                IF (N.LE.1) GO TO 1045                                          RU1TLD     62
                DP2=P2T(N)-P2T(N-1)                                             RU1TLD     63
                DP2X=ALOG(P2T(N))-ALOG(P2T(N-1))                                RU1TLD     64
65              IF (DP2.EQ.0.0) GO TO 1045                                      RU1TLD     65
                DR2DP2=(R2T(N)-R2T(N-1))/DP2                                    RU1TLD     66
                DU1DP2=(U1T(N)-U1T(N-1))/DP2                                    RU1TLD     67
                IF (DPEX.EQ.0.0) GO TO 1045                                     RU1TLD     68
                DR2DLN=DP2*DR2DP2/DP2X                                          RU1TLD     69
70              DU1DLN=DP2*DU1DP2/DP2X                                          RU1TLD     70
           1045 CONTINUE                                                        RU1TLD     71
                WRITE (6,1041)CM2,CP2,CH2                                       RU1TLD     72
                WRITE (6,1044) N,DN,P2Y,R2Y,U2Y,A2,M2Y,T2Y,S2Y                  RU1TLD     73
                WRITE (6,1044) N,DN0,P2,R2,U2,A2,M2,T2,S2                       RU1TLD     74
75              IF (N.LE.1) WRITE (6,1042)                                      RU1TLD     75
                IF (N.GT.1) WRITE (6,1044) DR2DP2,DU1DP2,DR2DLN,DU1DLN          RU1TLD     76
           1041 FORMAT(1H ,11X,21HDOWNSTREAM CONDITIONS,?1X,4HCM2=1PE13.6,1X,4HCP2 RU1TLD     77
               2=                                                               RU1TLD     78
               11PE13.6,1X,4HCH2=1PE13.6)                                       RU1TLD     79
80         1042 FORMAT(1HC)                                                     RU1TLD     80
           1044 FORMAT(1HD,13X,8HDR2/DP2=,1PE12.5,2X,8HDU1/DP2=,1PE12.5,3X,     RU1TLD     81
               18HDR2/DLNP2=,1PE12.5,2X,10HDU1/DLNP2=,1PE12.5)                  RU1TLD     82
           1044 FORMAT (1H ,14,2X,A4,1X,7(1PE15.7))                             RU1TLD     83
           1047 CONTINUE                                                        RU1TLD     84
85              IF (U1Y.GT.AMACHH) GO TO 105                                    RU1TLD     85
                N=N+1                                                           RU1TLD     86
                U1=U1Y*A1*1.02                                                  RU1TLD     87
                GO TO 103                                                       RU1TLD     88
                C - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -    RU1TLD     89
90         105  CONTINUE                                                        RU1TLD     90
                IF (NWRPRT.LT.2) GO TO 110                                      RU1TLD     91
                WRITE (6,120) (NNN,P2T(NNN),R2T(NNN),U1T(NNN),NNN=1M,NTOT)      RU1TLD     92
                NM=NTOT+1                                                       RU1TLD     93
           120  FORMAT(1H ,I3,1PE12.5,1X,1PE12.5,1X,1PE12.5)                    RU1TLD     94
95         110  CONTINUE                                                        RU1TLD     95
                IF (P2X.GT.P2T(NTOT)) GO TO 112                                 RU1TLD     96
                ARG=P2X                                                         RU1TLD     97
                CALL SEARCH(ARG,P2T,1,NTOT,1,NX,NERR)                           RU1TLD     98
           111  PL=P2T(NX)                                                      RU1TLD     99
100             PH=P2T(NX+1)                                                    RU1TLD    100
                FACT1=(ARG-PL)/(PH-PL)                                          RU1TLD    101
                RL=R2T(NX)                                                      RU1TLD    102
                RH=R2T(NX+1)                                                    RU1TLD    103
                RM=RL+FACT1*(RH-RL)                                             RU1TLD    104
105             UL=U1T(NX)                                                      RU1TLD    105
                UH=U1T(NX+1)                                                    RU1TLD    106
                UM=UL+FACT1*(UH-UL)                                             RU1TLD    107
                R2X=RM                                                          RU1TLD    108
                U1X=UM                                                          RU1TLD    109
110             IF (NWRPRT.EQ.0) RETURN                                         RU1TLD    110
                WRITE (6,118) FACT1,PL,ARG,PH,RL,RM,RH,UL,UM,UH                 RU1TLD    111
           118  FORMAT (1H ,11H*RU1TLD- F=,OPF7.4,1X,3H,P=,3(1PE10.3,1X),3H,R=, RU1TLD    112
               13(1PE10.3,1X),3H,U=,3(1PE10.3,1X))                              RU1TLD    113
                RETURN                                                          RU1TLD    114
```

```
                AMACHH=AMACHH*1.5                                                  RU1TLD   115
                WRITE (6,117) P2X,P2T(NTOT),R2T(NTOT),U1T(NTOT)                    RU1TLD   116
            117 FORMAT(1HO,25HARRY IN RU1TLD EXPANDED.  ,3HP2=1PE13.6,1X,6HP2(N)=  RU1TLD   117
               1 1PE13.6,1X,6HR2(N)=1PE13.6,1X,6HU1(N)=1PE13.6)                    RU1TLD   118
                GO TO 107                                                          RU1TLD   119
            120 114 WRITE (6,115)                                                  RU1TLD   120
            115 FORMAT(1HO,48HEXITED.  ARRY STORAGE IS INSUFFICIENT IN RU1TLD.)    RU1TLD   121
                IF (P2X.GT.P2T(NTOT)) STOP                                         RU1TLD   122
                GO TO 110                                                          RU1TLD   123
                END                                                                RU1TLD   124
```

```
      1                 SUBROUTINE SEARCH(X,Q,NL,NU,NS,NOUT,NERR)                SEARCH     2
                        DIMENSION Q(1)                                           SEARCH     3
                  20    IF (Q(NU)-Q(NL)) 30,40,40                                SEARCH     4
                  C     SET MONOTONIC DECREASING                                 SEARCH     5
      5           30    NTRN=-1                                                  SEARCH     6
                        IF (X.LT.Q(NU)) GO TO 69                                 SEARCH     7
                        IF (X.GT.Q(NL)) GO TO 68                                 SEARCH     8
                        GO TO 50                                                 SEARCH     9
                  C     X IS NOT WITHIN DESIGNATED BOUNDS.                       SEARCH    10
     10           68    NOUT=NL                                                  SEARCH    11
                        NERR=-1                                                  SEARCH    12
                        GO TO 70                                                 SEARCH    13
                  69    NOUT=NU                                                  SEARCH    14
                        NERR=1                                                   SEARCH    15
     15           70    RETURN                                                   SEARCH    16
                  C     SET MONOTONIC INCREASING                                 SEARCH    17
                  40    NTRN=1                                                   SEARCH    18
                        IF (X.LT.Q(NL)) GO TO 68                                 SEARCH    19
                        IF (X.GT.Q(NU)) GO TO 69                                 SEARCH    20
     20           50    NERR=0                                                   SEARCH    21
                        MI=NL                                                    SEARCH    22
                        MA=NL+((NU-NL)/NS)*NS                                    SEARCH    23
                        IF (NTRN) 130,60,60                                      SEARCH    24
                  60    IG=(MA-MI)/NS                                            SEARCH    25
     25                 IF (IG.LE.1) GO TO 120                                   SEARCH    26
                        MM=MI+NS*(IG/2)                                          SEARCH    27
                        IF (Q(MM)-X) 100,90,110                                  SEARCH    28
                  90    NOUT=MM                                                  SEARCH    29
                        RETURN                                                   SEARCH    30
     30           100   MI=MM                                                    SEARCH    31
                        GO TO 60                                                 SEARCH    32
                  110   MA=MM                                                    SEARCH    33
                        GO TO 60                                                 SEARCH    34
                  120   NOUT=MI                                                  SEARCH    35
     35                 RETURN                                                   SEARCH    36
                  130   IG=(MA-MI)/NS                                            SEARCH    37
                        IF (IG.LE.1) GO TO 120                                   SEARCH    38
                        MM=MI+NS*(IG/2)                                          SEARCH    39
                  140   IF (Q(MM)-X) 160,90,150                                  SEARCH    40
     40           150   MI=MM                                                    SEARCH    41
                        GO TO 130                                                SEARCH    42
                  160   MA=MM                                                    SEARCH    43
                        GO TO 130                                                SEARCH    44
                        END                                                      SEARCH    45
```

```
      SUBROUTINE SETSPC(NITT,RJT,NSPHIT,RET,PHIFDT)                     SETSPC     2
      LEVEL 2,ETEMP,ED,FD,GD,HD                                         CVARB      2
      COMMON/LARGE/ETEMP(4,24,41),ED(4,24,41),                          CVARB      3
     *     FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                   CVARB      4
      COMMON /PVARB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , W(24,4 PVARB      2
     *1) ,                                                              PVARB      3
     *     ROB(41)    , RO..(41) , VINF(41) , WINF(41) ,                PVARB      4
     *     ROBPH(41)  ,            RH(41)   , REZ(41)  , RBPH(41) ,     PVARB      5
     *    DTDPH(24,41), BET(41)  ,DTDZ(24,41),DTLR(41) , ACT(41)  ,     PVARB      6
     *     ICONST(50) , GAM(20)   , CONST(150) ,NPE(40)   , RS(41)  ,    PVARB      7
     *     RSZ(41)    , RSPHI(41), RST(41)   , RSZT(41), RSPHIT(41)     PVARB      8
      COMMON /IDVARB/RL,ETA(41),PHIP(41),DTIL(41),DTILE(41),DETA,TP(24) IDVARB     2
      COMMON/SVARB/T,Z     , PHI    , DT     , DZ     , DPHI   , ZIVF  ,  SVARB     2
     *     ZERO   , PI    , ALPHA , GAMMA , SIGMA , NPASCH , TAPE1 ,    SVARB     3
     *     TAPE2  , DISK1 , ALPH  , DISK2 , SIGM  , NPRINT , DZDT  ,    SVARB     4
     *     DZ(PH , ZM    , TYPED  , PHLD  , TPRV  , TYPE  , TTYU  ,     SVARB     5
     *     TTYPE  , RZ    , BZ     , DPHI  , NIT   , KPHI  , NITER ,     SVARB     6
     *     NPHI   , NPHI1 , NPHI2  , NPHI3 , NPHI1 , NPHI2 , NPHI3 ,    SVARB     7
     *     NT     , NT1   , NT2    , NT3   , PHIFD , NCONE , MACH  ,     SVARB     8
     *     PHIF   , METHOD, LAG    , NBC   , PINF  , RHOINF , UINF  ,    SVARB     9
     *     GINF,DIFM,ANGT,ZMAX,ZCG,ZSHIFT,IFMACH                          SVARB     10
      INTEGER DISK1,DISK2,TAPE1,TAPE2                                   SVARB     11
      COMMON/REALG/GAMMA,NUMAT,BLOOM,BLOYS,PSONIC,RSONIC,PINF,RINF      REALG     2
     *,VINF,NITMAX,NUPDAT                                               REALG     3
      COMMON/CONFIG/UPPO,LAPO,UPTO,UPCON,GASCON,UMO,UMSO,UMAO,UMNTO,UMGX CONFIG    2
      COMMON/ENTRD/S(41),ZBS,ZFLD,ITPHTB,ITPRTF,NCASE,NTUBES            ENTRD     2
      COMMON/CLUSTR/RJ,RI(24),TRI(24),TRIT(24)                          CLUSTR    2
      DIMENSION PB(45,45),PPB(45,45)                                    SETSPC    11
      DATA PB/2025*0.0/,PPB/2025*0.0/                                   SETSPC    12
      IF(NITT.EQ.NIT.AND.RJT.EQ.RJ) GO TO 54                            SETSPC    13
C.....RESPACE IN RADIAL DIRECTION                                       SETSPC    14
      WRITE (6,102) Z                                                   SETSPC    15
      MX=NT                                                             SETSPC    16
      NX=2*PHI                                                          SETSPC    17
      NC1=NX                                                            SETSPC    18
      MC1=NITT+2                                                        SETSPC    19
      SINRJ=SINH(RJT)                                                   SETSPC    20
      DO 57 J=3,NT2                                                     SETSPC    21
      T=TP(J)                                                           SETSPC    22
      X=RI(J)                                                           SETSPC    23
      IF(RJT.EQ.0.0) GO TO 57                                           SETSPC    24
      T=1.0/RJT*ALOG(X*SINH(RJ+SQRT(1.0+(X*SINH(RJ)**2))                SETSPC    25
   57 PB(NPHI1,J-2)=T                                                   SETSPC    26
      DO 65 N=1,4                                                       SETSPC    27
      DO 58 J=3,NT2                                                     SETSPC    28
      DO 58 K=3,NPHI                                                    SETSPC    29
      GO TO (61,62,63,64),N                                             SETSPC    30
   61 PB(K-2,J-2)=P(J,K)                                                SETSPC    31
      GO TO 58                                                          SETSPC    32
   62 PB(K-2,J-2)=U(J,K)                                                SETSPC    33
      GO TO 58                                                          SETSPC    34
   63 PB(K-2,J-2)=V(J,K)                                                SETSPC    35
      GO TO 58                                                          SETSPC    36
   64 PB(K-2,J-2)=W(J,K)                                                SETSPC    37
   58 CONTINUE                                                          SETSPC    38
      CALL ESPACE(PB,45,MX,NC1,MC1,PPB)                                 SETSPC    39
      DO 59 J=1,MC1                                                     SETSPC    40
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                      DO 59 K=1,NPHI2                                          SETSPC  41
                      GO TO (66,67,68,69),N                                    SETSPC  42
60                66  P(J+2,K+2)=PPB(K,J)                                      SETSPC  43
                      GO TO 59                                                 SETSPC  44
                  67  U(J+2,K+2)=PPB(K,J)                                      SETSPC  45
                      GO TO 59                                                 SETSPC  46
                  68  V(J+2,K+2)=PPB(K,J)                                      SETSPC  47
65                    GO TO 59                                                 SETSPC  48
                  69  W(J+2,K+2)=PPB(K,J)                                      SETSPC  49
                  59  CONTINUE                                                 SETSPC  50
                  65  CONTINUE                                                 SETSPC  51
                      WRITE(6,100) NIT,NITT,RJ,RJT                             SETSPC  52
70                    NIT=NITT                                                 SETSPC  53
                      NT2=NIT+4                                                SETSPC  54
                      RJ=RJT                                                   SETSPC  55
                      IF (NREAL.EQ.-1) GO TO 31                                SETSPC  56
                      DO 70 J=3,NT2                                            SETSPC  57
75                    DO 70 K=3,NPHI                                           SETSPC  58
                  70  PHI(J,K)=P(J,K)/(1.0-U(J,K)**2-V(J,K)**2-W(J,K)**2)     SETSPC  59
                      GO TO 34                                                 SETSPC  60
                  31  CONTINUE                                                 SETSPC  61
                      DO 32 J=3,NT2                                            SETSPC  62
80                    DO 32 K=3,NPHI                                           SETSPC  63
                      QSQ=U(J,K)**2+V(J,K)**2+W(J,K)**2                        SETSPC  64
                      PHI(J,K)=RHOFN(P(J,K),BODYN,QSQ)                         SETSPC  65
                  32  CONTINUE                                                 SETSPC  66
                  34  IF(NIPHIT.EQ.NIPHI.AND.RKT.EQ.RK.AND.PHIFDT.EQ.PHIFD) GO TO 56  SETSPC  67
85                C.....RESPACE IN MERIDIONAL DIRECTION                        SETSPC  68
                      WRITE (6,102)Z                                           SETSPC  69
                      NX=NT2+2                                                 SETSPC  70
                      MX=NX-2                                                  SETSPC  71
                      NC1=NT2+2                                                SETSPC  72
90                    MC1=NIPHIT+1                                             SETSPC  73
                      IF(RKT.EQ.0.0) GO TO 85                                  SETSPC  74
                      YO=0.5/RKT*ALOG((1.0+(EXP(RKT)-1.0)*PHIFDT/180.0)/       SETSPC  75
                     * (1.0-(1.0-EXP(-RKT))*PHIFDT/180.0))                     SETSPC  76
                      YO1=SINH(RKT*YO)                                         SETSPC  77
95                85  CONTINUE                                                 SETSPC  78
                      DO 55 K=3,NPHI                                           SETSPC  79
                      PB(NX-1,K-2)=RSPHI(K)                                    SETSPC  80
                      PB(NX-2,K-2)=RSZ(K)                                      SETSPC  81
                      PB(NX-3,K-2)=RS(K)                                       SETSPC  82
100                   IF(RKT.GT.0.0) GO TO 86                                  SETSPC  83
                      PB(NX,K-2)=PHIP(K)                                       SETSPC  84
                      GO TO 55                                                 SETSPC  85
                  86  Y(2)=(PHIP(K)/PHIFDT*RADI-1.0)**YO1                      SETSPC  86
                      PB(NX,K-2)=(YO+1.0/RKT*ALOG(YO2+SQRT(YO2**2+1.0)))*PI    SETSPC  87
105               55  CONTINUE                                                 SETSPC  88
                      DO 81 N=1,4                                              SETSPC  89
                      DO 60 J=3,NT2                                            SETSPC  90
                      DO 60 K=3,NPHI                                           SETSPC  91
                      GO TO (71,72,73,74),N                                    SETSPC  92
110               71  PB(J-2,K-2)=P(J,K)                                       SETSPC  93
                      GO TO 60                                                 SETSPC  94
                  72  PB(J-2,K-2)=U(J,K)                                       SETSPC  95
                      GO TO 60                                                 SETSPC  96
                  73  PB(J-2,K-2)=V(J,K)                                       SETSPC  97
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                      GO TO 60                                                  SETSPC   98
                74    PB(J-2,K-2)=W(J,K)                                        SETSPC   99
                60    CONTINUE                                                  SETSPC  100
                      CALL ESPACE(PB,+5,MD,NC1,MC1,PPB)                         SETSPC  101
                      NT2MD=NT2-2                                               SETSPC  102
                      DO 75 J=1,NT2MD                                           SETSPC  103
                      DO 75 K=1,MC1                                             SETSPC  104
                      GO TO (76,77,78,79),N                                     SETSPC  105
                76    P(J+2,K+2)=PPB(J,K)                                       SETSPC  106
                      IF (P(J+2,K+2).LE..0) WRITE (6,115) J,K,P(J+2,K+2)        SETSPC  107
                      IF(P(J+2,K+2) .LE. 0.0)P(J+2,K+2)=PINF**(1.-GAMMAMO.5)    SETSPC  108
                      GO TO 75                                                  SETSPC  109
                77    U(J+2,K+2)=PPB(J,K)                                       SETSPC  110
                      GO TO 75                                                  SETSPC  111
                78    V(J+2,K+2)=PPB(J,K)                                       SETSPC  112
                      GO TO 75                                                  SETSPC  113
                79    W(J+2,K+2)=PPB(J,K)                                       SETSPC  114
                75    CONTINUE                                                  SETSPC  115
                81    CONTINUE                                                  SETSPC  116
                      WRITE(6,101) MIPHI,MJPHIT,RX,RET,PHIFD,PHIFDT             SETSPC  117
                      MJPHI=MJPHIT                                              SETSPC  118
                      NPHI=MJPHI+3                                              SETSPC  119
                      RX=RET                                                    SETSPC  120
                      PHIFD=PHIFDT                                              SETSPC  121
                      IF (NPHIAL.EQ.-1)GO TO 33                                 SETSPC  122
                      DO 83 J=3,NT2                                             SETSPC  123
                      DO 80 K=3,NPHI                                            SETSPC  124
                80    RHO(J,K)=P(J,K)/(1.0-U(J,K)**2-V(J,K)**2-W(J,K)**2)       SETSPC  125
                      GO TO 83                                                  SETSPC  126
                33    CONTINUE                                                  SETSPC  127
                      DO 84 J=3,NT2                                             SETSPC  128
                      DO 84 K=3,NPHI                                            SETSPC  129
                      QSQ=U(J,K)**2+V(J,K)**2+W(J,K)**2                         SETSPC  130
                      RHO(J,K)=RHOFN(P(J,K),BODYM,QSQ)                          SETSPC  131
                84    CONTINUE                                                  SETSPC  132
                83    CONTINUE                                                  SETSPC  133
                      DO 82 K=1,MC1                                             SETSPC  134
                      RS(K+2)=PPB(NX-3,K)                                       SETSPC  135
                      RSZ(K+2)=PPB(NX-2,K)                                      SETSPC  136
                82    RSPHI(K+2)=PPB(NX-1,K)                                    SETSPC  137
                84    CONTINUE                                                  SETSPC  138
                      ICONST(48)=1                                              SETSPC  139
                      CALL INCTA                                                SETSPC  140
                      CALL PHDRY(2)                                             SETSPC  141
                115   FORMAT(5X,4HJ=2+,I2,5X,4HK=2+,I2,5X,3HP(J,K)=,E15.6)      SETSPC  142
                100   FORMAT(1HO,49HNUMBER OF POINTS IN RADIAL DIRECTION CHANGED FROM,I3 SETSPC  143
               *,                                                               SETSPC  144
               * 3H TO,I3,2HOR,/1X,31HRADIAL SPACING PARAMETER CHANGED FROM,F5.2, SETSPC  145
               * 3H TO,F5.2)                                                     SETSPC  146
                101   FORMAT(1HO,39HNUMBER OF MERIDIONAL PLANES CHANGED FROM ,I3,  SETSPC  147
                105   * 3H TO,I3,3H OR,/1X,40HMERIDIONAL SPACING PARAMETER CHANGED FROM,F5 SETSPC  148
               *,                                                               SETSPC  149
               *2,3H TO,F5.2,3H OR,/1X,29HCLUSTERING POINT CHANGED FROM,F6.1 3H TO SETSPC  150
               *,                                                               SETSPC  151
               * F6.1,8H DEGREES)                                               SETSPC  152
                102   FORMAT(1HO,13HSPACE AT 2+,1PE12.5)                        SETSPC  153
                      RETURN                                                    SETSPC  154
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      END
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SUBROUTINE SHOCK      76/76   OPT=1                    FTN 4.6+460      06/15/79 18.58.36      PAGE    1

 1              SUBROUTINE SHOCK(KK)                                                    SHOCK     2
                LEVEL 2,ETEMP,ED,FD,GD,HD                                               CWAPB     2
                COMMON/CWAPB/ETEMP(4,24,41),ED(4,24,41),                                CWAPB     3
               *      FD(4,24,41)    , GD(4,24,41) , HD(4,24,41)                       CWAPB     4
 5              COMMON /PWAPB/RHO(24,41) , P(24,41) , U(24,41) , V(24,41) , WE(24,4   PWAPB     2
               *1) ,                                                                   PWAPB     3
               *      RO0(41)    , ROBZ(41) , VINF(41) , WINF(41) ,                   PWAPB     4
               *      RCPH(41)   ,            PB(41)   , PBZ(41)  , PBPH(41) ,        PWAPB     5
               *     DTDPH(24,41), BCT(41)  ,DTDZ(24,41),DTDR 41) , ACT(41)  ,        PWAPB     6
10             *      ICONST(50) , GAM(20)  , (DAUT(50) ,APISAV    , PI(41)   ,      PWAPB     7
               *      RSZ(41)    , PSPHI(41), RST(41)   , RSZIT(41), PSPHIT(41,      PWAPB     8
                COMMON /IDWAPB/PE,ETA(41),PHIP(41),DTDR(41),DTDZ(41),DETA,TP(24)      IDWAPB    2
                COMMON/SWAPB/T,Z      , PHI    , DT     , DZ     , DPHI   , ZINT   ,  SWAPB     2
               *      ZEND   , PI     , ALPHA  , GAMMA  , SIGMA  , PHACH  , TAPE1  ,  SWAPB     3
15             *      TAPE2  , DISK1  , ALPH   , DISK2  , SIGM   , NPRNT  , DZDT   ,  SWAPB     4
               *      DZDPH  , ZM     , TMLO   , TMLD   , TMW    , TML    , TTMW   ,  SWAPB     5
               *      TTML   , RZ     , BZ     , NTPHI  , NIT    , EPHI   , NITER  ,  SWAPB     6
               *      NPHI   , NPHI1  , NPHI2  , NPHI3  , NPHM1  , NPHM2  , NPHM3  ,  SWAPB     7
               *      NT     , NT1    , NT2    , NT3    , PHIPD  , NTONE  , RADI   ,  SWAPB     8
20             *      PHIF   , MEIHOD , LAG    , NBC    , PINF   , RHOIN  , UINF   ,  SWAPB     9
               *      QINF,DIAM,ALPHGT,ZREF,ZCG,ZSHIFT,IFANEM                         SWAPB    10
                INTEGER DISK1,DISK2,TAPE1,TAPE2                                       SWAPB    11
                COMMON/PEALG/NPEAL,NWORAT,BCGTH,BOGYS,PSONIC,RSONIC,PINF,RINF         PEALG     2
               *,VINF,NITHG,NWPOUT                                                    PEALG     3
25         C...MACHINE-HACHINOT FUNCTIONS                                            SHOCK     8
                UITILD(A)=SQRT(C1+C2P(A-1.))                                          SHOCK     9
                DRSQZ(A,B,C,D)=(UINF*C+A*SQRT(DP(1.+B*D)+C*C))/D                      SHOCK    10
                RHOS(A)=(A+GRATIO)/(1.+GRATIO*A)                                      SHOCK    11
                ABAR(A,B,D,E,F)=(F-1.)*ABS(-UINF*D+A-B*E)/((D*D+1.+E*E)*F)            SHOCK    12
30              US(A,B,C)=A-C*B                                                       SHOCK    13
                VS(A,B)=A+B                                                           SHOCK    14
                WS(A,B,C)=A-B*C                                                       SHOCK    15
                GAMPI=GAMMA                                                           SHOCK    16
                GAPP1=GAMMA+1.                                                        SHOCK    17
35              GPMM1=GAMMA-1.                                                        SHOCK    18
                GMMTID=GMMI/GAMP1                                                     SHOCK    19
                GAPPID=GAP1/GAMMA                                                     SHOCK    20
                C1=0.5*GMMI*PINF/RHOIN                                                SHOCK    21
                C2=0.5*GAMP1/C1                                                       SHOCK    22
40         C...AUTOMATIC  MODE OF ATTACK INCREMENTER FOR CONE SOLUTIONS              SHOCK    23
                IF(NCONE.EQ.2.OR.KK.EQ.2) GO TO 17                                    SHOCK    24
                IF(ICONST(5).EQ.1) KLAG=0                                             SHOCK    25
                IF(KLAG .GT. 100)GO TO 17                                             SHOCK    26
                ALP=KLAG*ALPH/100.                                                    SHOCK    27
45              CONST(1)=SIN(ALP)                                                     SHOCK    28
                CONST(2)=COS(ALP)                                                     SHOCK    29
                UINF=UINF*CONST(2)                                                    SHOCK    30
                DO 18 K=2,NPHI1                                                       SHOCK    31
                PHI=PHIP(K)                                                           SHOCK    32
50              VINF(K)=-UINF*CONST(1)*COS(PHI)                                       SHOCK    33
             18 WINF(K)= UINF*CONST(1)*SIN(PHI)                                       SHOCK    34
                ALPD=ALP*RADI                                                         SHOCK    35
                KLAG=KLAG+1                                                           SHOCK    36
             17 CONTINUE                                                              SHOCK    37
55         12   CONTINUE                                                             SHOCK    38
                GO TO (1,2),KK                                                        SHOCK    39
           1    CONTINUE                                                             SHOCK    40
```

```
      C..SHOCK PREDICTOR                                                SHOCK   91
            DO 3 K=3,NPHI                                               SHOCK   92
   40 3     RST(K)=RS(K)+DZ*PSZ(K)                                      SHOCK   93
            DO 4 K=1,2                                                  SHOCK   94
            M=6-K                                                       SHOCK   95
            I=NPHI+K                                                    SHOCK   96
            N=NPHI-K                                                    SHOCK   97
   45       RST(K)=RST(M)                                               SHOCK   98
            RST(I)=RST(N)                                               SHOCK   99
      4     CONTINUE                                                    SHOCK  100
            DO 5 K=3,NPHI                                               SHOCK  101
            RSPH IT(K)=(RST(K+1)-RST(K-1))/(2.0*DETA)*DTIL(K)           SHOCK  102
   70       PS=P(NT2,K)                                                 SHOCK  103
            PSRAT=PS/PINF                                               SHOCK  104
            IF (NMIN .EQ. -1) GO TO 13                                  SHOCK  105
            UST=USTOLD(PSRAT)                                           SHOCK  106
            RHRAT=RHOS(PSRAT)                                           SHOCK  107
   75       GO TO 14                                                    SHOCK  108
      13    CALL RUSTLD(PS,RDST,UST)                                    SHOCK  109
            RHRAT=RDST/RHINF                                            SHOCK  110
      14    CONTINUE                                                    SHOCK  111
            RS1=RST(K)                                                  SHOCK  112
   80       RSPHR=RSPHIT(K)                                             SHOCK  113
            RSPHR=RSPHR/RS1                                             SHOCK  114
            FACT1=VINF(K)-WINF(K)*RSPHR                                 SHOCK  115
            FACT2=UINF*UINF-UST*UST                                     SHOCK  116
            IF(FACT2 .LT. 0.)UST=-UST                                   SHOCK  117
   85       IF(FACT2 .LT. 0.)WRITE(6,200)UINF,UST,FACT2                 SHOCK  118
     200 FORMAT(1H1,2F,SHUINF=,E13.6,3X,4HUST=,E13.6,3X,6HFACT2=,E13.6)  SHOCK  119
            RSZT1=SQRT(UST,RSPHR,FACT1,FACT2)                           SHOCK  120
            RSZT(K)=RSZT1                                               SHOCK  121
            RHRAT=RHOFRHINF(K),WINF(K),RSZT1,RSPHR,RHRAT)               SHOCK  122
   90       UST=USTOUINF,RHRAT,RSZT1)                                   SHOCK  123
            VST=VST(VINF(K),RHRAT)                                      SHOCK  124
            WST=WST(WINF(K),RHRAT,RSPHR)                                SHOCK  125
            IF (NMIN.EQ.0) RDST=RHRAT*RHOIN                             SHOCK  126
            RHO(NT2,K)=RDST                                             SHOCK  127
   95       U(NT2,K)=UST                                                SHOCK  128
            V(NT2,K)=VST                                                SHOCK  129
            W(NT2,K)=WST                                                SHOCK  130
            DATA N,NSMEN2/13,15/                                        SHOCK  131
            IF (NMIN .NE. -1) GO TO 5                                   SHOCK  132
  100       IF (NSPRAT.GE.2) WRITE (6,100) NSMEN1,K,PS,RDST,UST,UST,VST,WST,  SHOCK  133
           1RHRAT                                                       SHOCK  134
      5     CONTINUE                                                    SHOCK  135
            DO 6 K=1,2                                                  SHOCK  136
            M=6-K                                                       SHOCK  137
  105       I=NPHI+K                                                    SHOCK  138
            N=NPHI-K                                                    SHOCK  139
            RSZT(K)=RSZT(M)                                             SHOCK  140
            RSZT(I)=RSZT(N)                                             SHOCK  141
            RSPHIT(K)=-RSPHIT(M)                                        SHOCK  142
  110       RSPHIT(I)=-RSPHIT(N)                                        SHOCK  143
      6     CONTINUE                                                    SHOCK  144
            RETURN                                                      SHOCK  145
      2     CONTINUE                                                    SHOCK  146
      C..SHOCK CORRECTOR                                                SHOCK  147
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```
                      DO 8 K=3,NPHI                                          SHOCK    98
                    8 RS(K)=RS(K)-0.5*(RSZ(K)+RSZT(K))*DZ                    SHOCK    99
                      DO 9 K=1,2                                             SHOCK   100
                      M=6-K                                                  SHOCK   101
                      I=NPHI+K                                               SHOCK   102
                      N=NPHI-K                                               SHOCK   103
                      RS(K)=RS(M)                                            SHOCK   104
                      RS(I)=RS(N)                                            SHOCK   105
                    9 CONTINUE                                               SHOCK   106
                      DO 10 K=3,NPHI                                         SHOCK   107
                      RSPHI(K)=(RS(K+1)-RS(K-1))/(2.*DRETA)*DTIL(K)          SHOCK   108
                      PS=P(NT2,K)                                            SHOCK   109
                      PSRAT=PS/PINF                                          SHOCK   110
                      IF (MACH.EQ.-1) GO TO 15                               SHOCK   111
                      UIT=UITILD(PSRAT)                                      SHOCK   112
                      RHRAT=RHOS(PSRAT)                                      SHOCK   113
                      GO TO 16                                               SHOCK   114
                   15 CALL RHITLD(PS,RDSF,UIT)                               SHOCK   115
                      RHRAT=RDSF/RHINF                                       SHOCK   116
                   16 CONTINUE                                               SHOCK   117
                      RSI=RS(K)                                              SHOCK   118
                      RSPH=RSPHI(K)                                          SHOCK   119
                      RSPHR=RSPH/RSI                                         SHOCK   120
                      FACT1=VINF(K)-WINF(K)*RSPHR                            SHOCK   121
                      FACT2=UINF*RSPHR-UITRUIT                               SHOCK   122
                      IF(FACT2 .LT. 0.)UIT=-UIT                              SHOCK   123
                      IF(FACT2 .LT. 0.)WRITE(6,200)UINF,UIT,FACT2            SHOCK   124
                      RSZ1 =SHOCK(UIT,RSPHR,FACT1,FACT2)                     SHOCK   125
                      RSZ(K)=RSZ1                                            SHOCK   126
                      RHRAT=RHOS(VINF(K),WINF(K),RSZ1 ,RSPHR,RHRAT)          SHOCK   127
                      USF=US(UINF,RHRAT,RSZ1)                                SHOCK   128
                      VSF=VS(VINF(K),RHRAT)                                  SHOCK   129
                      WSF=WS(WINF(K),RHRAT,RSPHR)                            SHOCK   130
                      IF (MACH.EQ.0) RDSF=RHRAT*RHOIN                        SHOCK   131
                      RHO(NT2,K)=RDSF                                        SHOCK   132
                      U(NT2,K)=USF                                           SHOCK   133
                      V(NT2,K)=VSF                                           SHOCK   134
                      W(NT2,K)=WSF                                           SHOCK   135
                      IF (MACH.NE.-1) GO TO 10                               SHOCK   136
                      IF (RHRAT.GE.2) WRITE (6,100) NSHEN2,K,PS,RDSF,UIT,USF,VSF,WSF,  SHOCK   137
                     1RHRAT                                                  SHOCK   138
                   10 CONTINUE                                               SHOCK   139
                      DO 11 K=1,2                                            SHOCK   140
                      M=6-K                                                  SHOCK   141
                      I=NPHI+K                                               SHOCK   142
                      N=NPHI-K                                               SHOCK   143
                      RSZ(K)=RSZ(M)                                          SHOCK   144
                      RSZ(I)=RSZ(N)                                          SHOCK   145
                      RSPHI(K)=-RSPHI(M)                                     SHOCK   146
                      RSPHI(I)=-RSPHI(N)                                     SHOCK   147
                   11 CONTINUE                                               SHOCK   148
                      RETURN                                                 SHOCK   149
                  100 FORMAT(1H ,16H*SHOCK- STAT NO=,I2,1X,2HK=,I2,1X,2HP=,1PE11.4,1X,  SHOCK   150
                     12HR=1PE11.4,1X,3HUT=,1PE11.4,1X,2HU=,1PE11.4,1X,2HV=,1PE11.4,1X,  SHOCK   151
                     22HW=,1PE11.4,1X,3HRB=1PE11.4)                          SHOCK   152
                      END                                                    SHOCK   153
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```
      SUBROUTINE START (THETAS,HMFS,GAMMA,XD,THAB,M,MW,Y,U,V,RHO,P,MER,
     1ITH)                                                              START     2
C  A SUBROUTINE TO COMPUTE STARTING VALUES FROM CONICAL FLOW SOLUTION   START     3
      COMMON T(27)                                                      START     4
      COMMON /COM1/MER1,GAMMA1                                          BLANK     2
      COMMON /ERINT/IER                                                 COM1      2
      EXTERNAL DERIV                                                    ERINT     2
      DIMENSION TH(M),Y(M),U(M),V(M),RHO(M),P(M)                        START     8
      GAMMA1=GAMMA                                                      START     9
      MER=0                                                             START    10
      CALL USTHW(HMFS,THETAS,GAMMA,US,THETAW,MER)                       START    11
      IF(MER) 999,50,999                                                START    12
   50 MM=M-1                                                            START    13
      MW=MW-1                                                           START    14
      DS=XD/COS(THETAS)                                                 START    15
      THDIF=THETAS-THAB                                                 START    16
      YW=(DS*SIN(THETAW-THETAS))/COS(THETAW-THAB)                       START    17
      DELY=YW/MW                                                        START    18
      DO 100 I=1,M                                                      START    19
      AI=I                                                              START    20
  100 TH(I)=THETAS+  ATAN(((AI-1.0)*DELY*COS(THDIF))/(DS+(AI-1.0)*DELY* START    21
     1SIN(THDIF)))                                                      START    22
  210 Z1=HMFS**2*SIN(THETAW)**2                                         START    23
      Z2=GAMMA+1.0                                                      START    24
      Z3=GAMMA-1.0                                                      START    25
      P2OP1= ((Z2*Z1)/(Z3*Z1+2.0))**(GAMMA/Z3)*(Z2/(2.0*GAMMA*Z1-Z3))** START    26
     1(1.0/Z3)                                                          START    27
      WFS=SQRT((Z3*HMFS**2/2.0)/(1.0+Z3*HMFS**2/2.0))                   START    28
      T(2)=TH(1)                                                        START    29
      T(4)=0.0                                                          START    30
      T(5)=US                                                           START    31
      I=0                                                               START    32
  300 I=I+1                                                             START    33
      AI=I                                                              START    34
      CIAB=COS(T(2)-THAB)                                               START    35
      SIAB=SIN(T(2)-THAB)                                               START    36
      Y(I)=(AI-1.0)*DELY                                                START    37
      U(I)=T(5)*CIAB-T(4)*SIAB                                          START    38
      V(I)=T(4)*CIAB+T(5)*SIAB                                          START    39
      P(I)=P2OP1*(1.0-T(4)**2-T(5)**2)**(GAMMA/Z3)                      START    40
      RHO(I)=P2OP1*(1.0-T(4)**2-T(5)**2)**(1.0/Z3)                      START    41
      IF((I+1).GT.MW) GO TO 999                                         START    42
      T(3)=TH(I+1)-TH(I)                                                START    43
      T2=T(2)                                                           START    44
  400 CALL INTS(T,2,0.5,5.0E-6,0.0,0.0,0.0,T3           ,0.0,0.0,DERIV) START    45
      IF (IER.NE.0) GO TO 998                                           START    46
  450 CALL INTM(T,2,0.5,5.0E-6,0.0,0.0,0.0,T3           ,0.0,0.0,DERIV) START    47
      IF (IER.NE.0) GO TO 998                                           START    48
      IF(T(2)-TH(I+1))475,500,500                                       START    49
  500 IF(ABS(T(2)-TH(I+1))-5.0E-6) 300,300,600                          START    50
  600 T(2)=T2                                                           START    51
      T(3)=TH(I+1)-T2                                                   START    52
      T(4)=T4                                                           START    53
      T(5)=T5                                                           START    54
      CALL INTS(T,2,2,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,DERIV)       START    55
      IF (IER.NE.0) GO TO 998                                           START    56
      CALL INTM(T,2,2,0.0,0.0,0.0 0.0,0.0,0.0,0.0,0.0,DERIV)           START    57
                                                                        START    58
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                      IF (IER.NE.0) GO TO 998                    START     59
                      GO TO 500                                  START     60
60          475       T2=T(2)                                    START     61
                      T4=T(4)                                    START     62
                      T5=T(5)                                    START     63
                      GO TO 450                                  START     64
                998   MEA=MEA1                                   START     65
65              999   RETURN                                     START     66
                      END                                        START     67
```

```
1                SUBROUTINE USTHW (MFS,THETAS,GAMMA,US,THETAW,MER)                    USTHW     2
               C A SUBROUTINE TO COMPUTE SURFACE VELOCITY AND MACH ANGLE WHEN         USTHW     3
               C THE FREE STREAM MACH NUMBER AND CONE ANGLE ARE GIVEN                 USTHW     4
                     MER=0                                                            USTHW     5
5                    US1=SQRT((GAMMA-1.0)/(GAMMA+1.0))                                USTHW     6
                     CALL MMACH(US1,THETAS,GAMMA,MM1,THETAW,MER)                      USTHW     7
                     IF(MFS-MM1) 200,100,10                                           USTHW     8
               200   MER=3                                                            USTHW     9
                     GO TO 999                                                        USTHW    10
10             100   US=US1                                                           USTHW    11
                     GO TO 999                                                        USTHW    12
                10   IF(MER) 999,20,999                                               USTHW    13
                20   IF(US1-0.700) 21,22,22                                           USTHW    14
                21   US3=0.3*(US1+1.0)                                               USTHW    15
15                   GO TO 23                                                         USTHW    16
                22   US3=US1+0.005                                                    USTHW    17
                23   CONTINUE                                                         USTHW    18
                     CALL MMACH(US3,THETAS,GAMMA,MM3,THETAW,MER)                      USTHW    19
                     IF(MER) 999,25,999                                               USTHW    20
20              25   IF(MFS-MM3)30,27,29                                              USTHW    21
                27   US=US3                                                           USTHW    22
                     GO TO 999                                                        USTHW    23
                29   US1=US3                                                          USTHW    24
                     MM1=MM3                                                          USTHW    25
25                   GO TO 20                                                         USTHW    26
                30   US2=0.5*(US1+US3)                                                USTHW    27
                     CALL MMACH(US2,THETAS,GAMMA,MM2,THETAW,MER)                      USTHW    28
                     DELT=(MM2-MM1)*(MM3-MM1)**2-(MM3-MM1)*(MM2-MM1)**2               USTHW    29
                     A1=((US2-US1)*(MM3-MM1)**2-(US3-US1)*(MM2-MM1)**2) /DET          USTHW    30
30                   A2=((MM2-MM1)*(US3-US1)-(US2-US1)*(MM3-MM1))/DELT                USTHW    31
                     USE=US1+A1*(MFS-MM1)+A2*(MFS-MM1)**2                             USTHW    32
                40   CALL MMACH(USE,THETAS,GAMMA,MMAC,THETAW,MER)                     USTHW    33
                     IF(ABS(1.0-MFS/MMAC)-2.0E-4) 45,45,60                            USTHW    34
                45   US=USE                                                           USTHW    35
35                   GO TO 999                                                        USTHW    36
                60   USE=USE+(A1+2.0*A2*(MMAC-MM1))*(MFS-MMAC)                        USTHW    37
                     GO TO 40                                                         USTHW    38
               999   RETURN                                                           USTHW    39
                     END                                                              USTHW    40
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SUBROUTINE ZERDIN     76/76   OPT=1                FTN 4.6+440      06/15/79 18.58.56      PAGE     1

 1                    SUBROUTINE ZERDIN(X1,Y1,TOLR,FYN,BOL,X,Y)                                ZERDIN     2
                      LOGICAL BOL                                                              ZERDIN     3
                      A=X1                                                                     ZERDIN     4
                      FA=FYN(A)                                                                ZERDIN     5
 5                    B=Y1                                                                     ZERDIN     6
                      X=B                                                                      ZERDIN     7
                      FB=FYN(B)                                                                ZERDIN     8
                10    C=A                                                                      ZERDIN     9
                      FC=FA                                                                    ZERDIN    10
10              20    IF ( ABS(FC) .GE. ABS(FB) ) GO TO 30                                     ZERDIN    11
                      A=B                                                                      ZERDIN    12
                      FA=FB                                                                    ZERDIN    13
                      X=C                                                                      ZERDIN    14
                      B=C                                                                      ZERDIN    15
15                    FB=FC                                                                    ZERDIN    16
                      C=A                                                                      ZERDIN    17
                      FC=FA                                                                    ZERDIN    18
                30    TOL=TOLR*AMAX1(ABS(A),ABS(B))                                            ZERDIN    19
                      EM=0.5*(C-B)                                                             ZERDIN    20
20                    IF ( ABS(EM-B) .LE. TOL) GO TO 40                                        ZERDIN    21
                      P=(B-A)*FB                                                               ZERDIN    22
                      IF (P .GT. 0.0) GO TO 31                                                 ZERDIN    23
                      Q=FB-FA                                                                  ZERDIN    24
                      P=-P                                                                     ZERDIN    25
25                    GO TO 32                                                                 ZERDIN    26
                31    Q= FA - FB                                                               ZERDIN    27
                32    A=B                                                                      ZERDIN    28
                      FA=FB                                                                    ZERDIN    29
                      IF ( P .LE. ABS(Q)*TOL) GO TO 34                                         ZERDIN    30
30                    IF ( P .LT. (EM-B)*Q ) GO TO 33                                          ZERDIN    31
                      X=EM                                                                     ZERDIN    32
                      B=EM                                                                     ZERDIN    33
                      GO TO 35                                                                 ZERDIN    34
                33    X=P/Q+B                                                                  ZERDIN    35
35                    B=X                                                                      ZERDIN    36
                      GO TO 35                                                                 ZERDIN    37
                34    X=SIGN(TOL,C-B)+B                                                        ZERDIN    38
                      B=X                                                                      ZERDIN    39
                35    FB=FYN(X)                                                                ZERDIN    40
40                    IF (FB.EQ.0.0) GO TO 50                                                  ZERDIN    41
                      IF ( SIGN(1.,FC) .EQ. SIGN(1.,FB) ) GO TO 10                             ZERDIN    42
                      GO TO 20                                                                 ZERDIN    43
                40    Y=C                                                                      ZERDIN    44
                      BOL= SIGN(1.,FB)*SIGN(1.,FC) .LE. 0.0                                    ZERDIN    45
45                    RETURN                                                                   ZERDIN    46
                50    BOL=.TRUE.                                                               ZERDIN    47
                      Y=B                                                                      ZERDIN    48
                      RETURN                                                                   ZERDIN    49
                      END                                                                      ZERDIN    50
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TABLE OF CONTENTS

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1                SUBROUTINE TAINT(XTAB,FTAB,X,FX,N,K,NER, MON)                  TAINT      2
                 DIMENSION XTAB(1),FTAB(1),T(10),C(10)                          TAINT      3
              CPSOHOO  TAINT SUBROUTINE- IN FORTRAN II.                         TAINT      4
                 IF (N - K) 1,1,2                                               TAINT      5
5                1 NER=2                                                        TAINT      6
                 RETURN                                                         TAINT      7
                 2 IF (K-9) 3,3,1                                               TAINT      8
                 3 IF ( MON) 4,4,5                                              TAINT      9
                 5 IF ( MON-2) 6,7,4                                            TAINT     10
10               4 J=0                                                          TAINT     11
                   NM1=N-1                                                      TAINT     12
                   DO 8 I=1,NM1                                                 TAINT     13
                   IF (XTAB(I)-XTAB(I+1)) 9,11,10                               TAINT     14
                11 NER=3                                                        TAINT     15
15                 RETURN                                                       TAINT     16
                 9 J=J-1                                                        TAINT     17
                   GO TO 8                                                      TAINT     18
                10 J=J+1                                                        TAINT     19
                 8 CONTINUE                                                     TAINT     20
20                 MON=1                                                        TAINT     21
                   IF (J) 12,6,6                                                TAINT     22
                12 MON=2                                                        TAINT     23
                 7 DO 13 I=1,N                                                  TAINT     24
                   IF (X-XTAB(I)) 14,14,13                                      TAINT     25
25               14 J=I                                                         TAINT     26
                   GO TO 18                                                     TAINT     27
                13 CONTINUE                                                     TAINT     28
                   GO TO 15                                                     TAINT     29
                 6 DO 16 I=1,N                                                  TAINT     30
30                 IF (X-XTAB(I)) 16,17,17                                      TAINT     31
                17 J=I                                                          TAINT     32
                   GO TO 18                                                     TAINT     33
                16 CONTINUE                                                     TAINT     34
                15 J=N                                                          TAINT     35
35              18 J=J-(K+1)/2                                                  TAINT     36
                   IF (J) 19,19,20                                              TAINT     37
                19 J=1                                                          TAINT     38
                20 M=J+K                                                        TAINT     39
                   IF (M-N) 21,21,22                                            TAINT     40
40              22 J=J-1                                                        TAINT     41
                   GO TO 20                                                     TAINT     42
                21 KP1=K+1                                                      TAINT     43
                   JSAVE=J                                                      TAINT     44
                26 DO 23 L=1,KP1                                                TAINT     45
45                 C(L)=X-XTAB(J)                                               TAINT     46
                   T(L)=FTAB(J)                                                 TAINT     47
                23 J=J+1                                                        TAINT     48
                   DO 24 J=1,K                                                  TAINT     49
                   I=J+1                                                        TAINT     50
50              25 T(I)=(C(J)*T(I)-C(I)*T(J))/(C(J)-C(I))                       TAINT     51
                   I=I+1                                                        TAINT     52
                   IF (I-KP1) 25,25 ,24                                         TAINT     53
                24 CONTINUE                                                     TAINT     54
                   FX=T(KP1)                                                    TAINT     55
55                 NER=1                                                        TAINT     56
                   RETURN                                                       TAINT     57
                   END                                                          TAINT     58
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SUBROUTINE GEOMN      78/76   OPT=1                    FTN 4.6+460      06/15/79  18.58.36      PAGE     1

1                SUBROUTINE GEOMN(K7,PHIP,NPHI,Z,R,RZ,RPHI,IPRNT,ZO,ZJUNC,NCONE)    GEOMN     2
                 C                                                                   GEOMN     3
                 COMMON/BODY/ARR(52),IND(500),X(3),XU(3),DUM1(6),XW(3),DUM2(33)      GEOMN     4
                 COMMON/MINITB/ZSAV(25),NPSAV(25),NOW                                GEOMN     5
5                C                                                                   GEOMN     6
                 DIMENSION PHIP(41),R(41),RZ(41),RPHI(41)                            GEOMN     7
                 DIMENSION RCONE(41),RPCONE(41),RZCONE(41)                           GEOMN     8
                 C                                                                   GEOMN     9
                 DATA EPS,NIT,ISTRT/.1E-5,20,3/                                      GEOMN    10
10               C                                                                   GEOMN    11
                 IF(K7.GT.0)  GO TO 21                                               GEOMN    12
                 IFLAG=0                                                             GEOMN    13
                 READ(5,457)  NPAT                                                   GEOMN    14
                457  FORMAT(I5)                                                     GEOMN    15
15               CALL OPENMS(1,IND,500,0)                                            GEOMN    16
                 CALL READMS(1,ZSAV,51,NPAT+1)                                       GEOMN    17
                 RETURN                                                              GEOMN    18
                  21 IF(IFLAG.EQ.0) GO TO 458                                        GEOMN    19
                  22 IF(NCONE.EQ.2) GO TO 456                                        GEOMN    20
20               C                                                                   GEOMN    21
                 ZFRACT=(Z-ZO)/(ZJUNC-ZO)                                            GEOMN    22
                 DO 20 I=ISTRT,NPHI                                                  GEOMN    23
                 R(I)=RCONE(I)*ZFRACT                                                GEOMN    24
                 RPHI(I)=RPCONE(I)*ZFRACT                                            GEOMN    25
25               20  RZ(I)=RZCONE(I)                                                 GEOMN    26
                 GO TO 18                                                            GEOMN    27
                 C                                                                   GEOMN    28
                  458 ZSAVE=Z                                                        GEOMN    29
                 Z=ZJUNC                                                             GEOMN    30
30               456  DO 17 I=ISTRT,NPHI                                            GEOMN    31
                 IEND=0                                                              GEOMN    32
                 PHI=PHIP(I)                                                         GEOMN    33
                 IF(I.NE.ISTRT)  GO TO 40                                            GEOMN    34
                 U=W=.5                                                              GEOMN    35
35               C                                                                   GEOMN    36
                 DO 1 J=1,NOW                                                        GEOMN    37
                 NSEG=J                                                              GEOMN    38
                 IF(Z.LE.ZSAV(J+1))GO TO 3                                           GEOMN    39
                   1 CONTINUE                                                        GEOMN    40
40               WRITE(6,100)Z                                                       GEOMN    41
                 100 FORMAT(* STOP - GEOMN - Z = *,E12.5,* EXCEEDS TABLE*)           GEOMN    42
                   3 NPAT=NPSAV(NSEG+1)                                              GEOMN    43
                   4 CALL READMS(1,ARR,52,NPAT)                                      GEOMN    44
                 C   WRITE(6,105)NPAT, ,PHI,(ARR(IO),IO=49,52)                      GEOMN    45
45               105 FORMAT(* NPAT,Z,PHI,RB = *,I5,6E12.5)                          GEOMN    46
                  40 IEW=IEW=0                                                       GEOMN    47
                 C                                                                   GEOMN    48
                 DO 15 IT=1,NIT                                                      GEOMN    49
                 CALL POINT(NPAT,U,W,1)                                              GEOMN    50
50               X(2)=ABS(X(2))                                                      GEOMN    51
                 PH=ATAN2(X(2),-X(1))                                                GEOMN    52
                 G=PH-PHI                                                            GEOMN    53
                 F=X(3)-Z                                                            GEOMN    54
                 C   WRITE(6,106)IT,NPAT,U,W,F,G                                     GEOMN    55
55               106 FORMAT(* IT,NPAT,U,W,F,G = *,2I5,4E12.5)                       GEOMN    56
                 IF(ABS(F).LT.EPS.AND.ABS(G).LT.EPS)IEND=1                           GEOMN    57
                 RAD2=X(1)**2+X(2)**2                                                GEOMN    58
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      DPHIDU=(X(2)*XU(1)-X(1)*XU(2))/RAD2                                GEOMN   59
      DPHIDW=(X(2)*XW(1)-X(1)*XW(2))/RAD2                                GEOMN   60
60    DEN=XU(3)*DPHIDW-XW(3)*DPHIDU                                      GEOMN   61
      IF(IEND.EQ.1)GO TO 16                                              GEOMN   62
      IF(DEN.NE.0.)GO TO 5                                               GEOMN   63
      WRITE(6,102)                                                       GEOMN   64
  102 FORMAT(* STOP - GEOMN - DEN = 0.*)                                 GEOMN   65
65    GO TO 18                                                           GEOMN   66
    5 W=W+(F*DPHIDU-G*XU(3))/DEN                                         GEOMN   67
      U=U+(G*XW(3)-F*DPHIDW)/DEN                                         GEOMN   68
      IF(IPRNT.EQ.2)WRITE(6,106)IT,NPAT,U,W,F,G                          GEOMN   69
      IF(W.LT.0.)GO TO 7                                                 GEOMN   70
70    IF(W.GT.1.)GO TO 9                                                 GEOMN   71
    6 IF(U.LT.0.)GO TO 11                                                GEOMN   72
      IF(U.GT.1.)GO TO 13                                                GEOMN   73
      GO TO 15                                                           GEOMN   74
    7 IF(AAR(52).NE.0.)GO TO 70                                          GEOMN   75
75    W=0.                                                               GEOMN   76
      GO TO 6                                                            GEOMN   77
   70 W=1.                                                               GEOMN   78
      IF(IEW.EQ.0)GO TO 8                                                GEOMN   79
      NPAT=AAR(52)                                                       GEOMN   80
80    IF(NPAT.EQ.0)GO TO 900                                             GEOMN   81
      GO TO 400                                                          GEOMN   82
    8 IEW=1                                                              GEOMN   83
      W=0.                                                               GEOMN   84
      GO TO 6                                                            GEOMN   85
85    9 IF(AAR(50).NE.0.)GO TO 71                                        GEOMN   86
      W=1.                                                               GEOMN   87
      GO TO 6                                                            GEOMN   88
   71 W=0.                                                               GEOMN   89
      IF(IEW.EQ.0)GO TO 10                                               GEOMN   90
90    NPAT=AAR(50)                                                       GEOMN   91
      IF(NPAT.EQ.0)GO TO 900                                             GEOMN   92
      GO TO 400                                                          GEOMN   93
   10 IEW=1                                                              GEOMN   94
      W=1.                                                               GEOMN   95
95    GO TO 15                                                           GEOMN   96
   11 IF(AAR(49).NE.0.)GO TO 72                                          GEOMN   97
      U=0.                                                               GEOMN   98
      GO TO 15                                                           GEOMN   99
   72 U=1.                                                               GEOMN  100
100   IF(IEU.EQ.0)GO TO 12                                               GEOMN  101
      NPAT=AAR(49)                                                       GEOMN  102
      IF(NPAT.EQ.0)GO TO 900                                             GEOMN  103
      GO TO 400                                                          GEOMN  104
   12 IEU=1                                                              GEOMN  105
105   U=0.                                                               GEOMN  106
      GO TO 15                                                           GEOMN  107
   13 IF(AAR(51).NE.0.)GO TO 73                                          GEOMN  108
      U=1.                                                               GEOMN  109
      GO TO 15                                                           GEOMN  110
110   73 U=0.                                                            GEOMN  111
      IF(IEU.EQ.0)GO TO 14                                               GEOMN  112
      NPAT=AAR(51)                                                       GEOMN  113
      IF(NPAT.EQ.0)GO TO 900                                             GEOMN  114
      GO TO 400                                                          GEOMN  115
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199

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                    14 IEU=1                                                    GEOMN  116
                       U=1.                                                     GEOMN  117
                       GO TO 15                                                 GEOMN  118
                   400 CALL READMS(1,AAR,52,NPAT)                               GEOMN  119
                       IEU=IEU+0                                                GEOMN  120
                    15 CONTINUE                                                 GEOMN  121
                C                                                               GEOMN  122
                       WRITE(6,103)F,G,EPS                                      GEOMN  123
                   103 FORMAT(* STOP - GEOMN - EXCEEDED MAX ITERATIONS - F,G,EPS = *,3E12 GEOMN  124
                      1.5)                                                      GEOMN  125
                       WRITE(6,108)I,NPAT,PHI,Z                                 GEOMN  126
                   108 FORMAT(* I,NPAT,PHI,Z=*,5X,2I10,2F20.6)                  GEOMN  127
                       GO TO 16                                                 GEOMN  128
                C                                                               GEOMN  129
                   900 WRITE(6,104)                                             GEOMN  130
                   104 FORMAT(* STOP - GEOMN - PATCH POINTER <0*)               GEOMN  131
                       GO TO 16                                                 GEOMN  132
                C                                                               GEOMN  133
                    16 R(I)=SQRT(RR)2)                                          GEOMN  134
                       DRDW=(R(I)*XW(1)+R(2)*XW(2))/R(I)                        GEOMN  135
                       DRDU=(R(I)*XU(1)+R(2)*XU(2))/R(I)                        GEOMN  136
                       RZ(I)=(DPHIDW*DRDU-DPHIDU*DRDW)/DEN                      GEOMN  137
                       RPHI(I)=(DRDW*XU(3)-DRDU*XW(3))/DEN                      GEOMN  138
                       IF(IPRNT.EQ.0)GO TO 17                                   GEOMN  139
                       PHD=PHI/.01745329                                        GEOMN  140
                       IF(IPRNT.EQ.2) WRITE(6,107)I,PHD,X,DRDU,DRDW,DPHIDU,DPHIDW,DEN GEOMN  141
                   107 FORMAT(I5,F7.1,9E12.5)                                   GEOMN  142
                    17 CONTINUE                                                 GEOMN  143
                       RPHI(ISTRT)=0.0                                          GEOMN  144
                       RPHI(NPHI)=0.0                                           GEOMN  145
                C                                                               GEOMN  146
                       IF(IFLAG.GT.0) GO TO 18                                  GEOMN  147
                       ZFRACT=1.0/(ZJUMP-Z0)                                    GEOMN  148
                       DO 19 I=ISTRT,NPHI                                       GEOMN  149
                       RCONE(I)=R(I)                                            GEOMN  150
                       RPCONE(I)=RPHI(I)                                        GEOMN  151
                    19 RZCONE(I)=R(I)*ZFRACT                                    GEOMN  152
                       Z=ZSAVE                                                  GEOMN  153
                       IFLAG=1                                                  GEOMN  154
                       GO TO 22                                                 GEOMN  155
                C                                                               GEOMN  156
                    18 RETURN                                                   GEOMN  157
                       END                                                      GEOMN  158
```

```
      SUBROUTINE POINT(K,U,W,ND)                                        POINT      2
      COMMON/BODY/AAR(52),IND(500),X(3),XU(3),XUU(3),X3U(3),XW(3),XUW(3 POINT      3
     1),X2UW(3),X3UW(3),XWW(3),XU2W(3),X2U2W(3),X3U2W(3),X3W(3),XU3W(3), POINT      4
     2X2U3W(3),X3U3W(3)                                                 POINT      5
      ND1=ND+1                                                          POINT      6
      DO 10 I=1,3                                                       POINT      7
      J=16*(I-1)                                                        POINT      8
      J1=J+1                                                            POINT      9
      J2=J+5                                                            POINT     10
      J3=J+9                                                            POINT     11
      A1=((AAR(J1)*U+AAR(J2))*U+AAR(J3))*U+AAR(J3+4)                    POINT     12
      IF(ND1.EQ.1)GO TO 1                                               POINT     13
      C1=AAR(J1)+AAR(J1)+AAR(J1)                                        POINT     14
      C2=AAR(J2)+AAR(J2)                                                POINT     15
      A1P=(C1*U+C2)*U+AAR(J3)                                           POINT     16
      IF(ND1.EQ.2)GO TO 1                                               POINT     17
      A1PP=(C1+C1)*U+C2                                                 POINT     18
    1 J1=J1+1                                                           POINT     19
      J2=J2+1                                                           POINT     20
      J3=J3+1                                                           POINT     21
      A2=((AAR(J1)*U+AAR(J2))*U+AAR(J3))*U+AAR(J3+4)                    POINT     22
      IF(ND1.EQ.1)GO TO 2                                               POINT     23
      C1=AAR(J1)+AAR(J1)+AAR(J1)                                        POINT     24
      C2=AAR(J2)+AAR(J2)                                                POINT     25
      A2P=(C1*U+C2)*U+AAR(J3)                                           POINT     26
      IF(ND1.EQ.2)GO TO 2                                               POINT     27
      A2PP=(C1+C1)*U+C2                                                 POINT     28
    2 J1=J1+1                                                           POINT     29
      J2=J2+1                                                           POINT     30
      J3=J3+1                                                           POINT     31
      A3=((AAR(J1)*U+AAR(J2))*U+AAR(J3))*U+AAR(J3+4)                    POINT     32
      IF(ND1.EQ.1)GO TO 3                                               POINT     33
      C1=AAR(J1)+AAR(J1)+AAR(J1)                                        POINT     34
      C2=AAR(J2)+AAR(J2)                                                POINT     35
      A3P=(C1*U+C2)*U+AAR(J3)                                           POINT     36
      IF(ND1.EQ.2)GO TO 3                                               POINT     37
      A3PP=(C1+C1)*U+C2                                                 POINT     38
    3 J1=J1+1                                                           POINT     39
      J2=J2+1                                                           POINT     40
      J3=J3+1                                                           POINT     41
      A4=((AAR(J1)*U+AAR(J2))*U+AAR(J3))*U+AAR(J3+4)                    POINT     42
      IF(ND1.EQ.1)GO TO 4                                               POINT     43
      C1=AAR(J1)+AAR(J1)+AAR(J1)                                        POINT     44
      C2=AAR(J2)+AAR(J2)                                                POINT     45
      A4P=(C1*U+C2)*U+AAR(J3)                                           POINT     46
      IF(ND1.EQ.2)GO TO 4                                               POINT     47
      A4PP=(C1+C1)*U+C2                                                 POINT     48
    4 X(I)=((A1*W+A2)*W+A3)*W+A4                                        POINT     49
      IF(ND1.EQ.1)GO TO 10                                              POINT     50
      XU(I)=((A1P*W+A2P)*W+A3P)*W+A4P                                   POINT     51
      C1=A1+A1+A1                                                       POINT     52
      C2=A2+A2                                                          POINT     53
      XW(I)=(C1*W+C2)*W+A3                                              POINT     54
      IF(ND1.EQ.2)GO TO 10                                              POINT     55
      XUU(I)=((A1PP*W+A2PP)*W+A3PP)*W+A4PP                              POINT     56
      XUW(I)=((A1P+A1P+A1P)*W+A2P+A2P)*W+A3P                            POINT     57
      XWW(I)=(C1+C1)*W+C2                                               POINT     58
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                10 CONTINUE                                          POINT      59
                   RETURN                                            POINT      60
60                 END                                               POINT      61
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15. Supplementary Notes

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Topical Report

16. Abstract

The use of a computer code for the calculation of steady, supersonic, three-dimensional, inviscid flow over blunt bodies is illustrated. Input and output are given and explained for two cases: a pointed cone of 20° half angle at 15° angle of attack in a free stream with $M_\infty = 7$, and a cone-ogive-cylinder at 10° angle of attack with $M_\infty = 2.86$.

A source listing of the computer code is provided.

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